A Work Project, presented as part of the requirements for the Award of a Master's degree in Finance and Management from the Nova – School of Business and Economics

Understanding the aviation industry and its global impact: why are airlines destroying shareholder value and how do they contribute to the world economy?

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Why are airlines destroying shareholder value and how do they contribute to the world economy?

Abstract

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

2. Why is the aviation industry destroying shareholder value?

3. What are the spillovers of the aviation industry?

4. Scalability: a new challenge for the future

Keywords: commercial passenger airlines, destruction of shareholder value, spillovers & scalability

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), PORLisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and PORNorte (Social Sciences DataLab, Project 22209).

Why are airlines destroying shareholder value and how do they contribute to the world economy?

Executive summary

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

- The commercial passenger airlines segment – full-service carriers (FSCs) and low-cost carriers (LCCs) – is the main driver of the industry due to its highest value and volume
- From the segment analysis conducted it is apparent that FSCs focus on providing the best services to attract customers looking for a reliable and comfortable airline which is achieved through differentiation. On the other hand, LCCs make every effort to provide the cheapest service to attract price-sensitive customers through cost leadership
- Furthermore, a Porter's Five Forces analysis concluded that airline's bottom line is squeezed due to powerful suppliers

→ The main driver of the aviation industry has been identified, it is now crucial to analyse why the industry is destroying shareholder value

2. Why is the aviation industry destroying shareholder value?

- This chapter reveals that four factors lead to aviation's low profitability – Threatening Forces, Volatile Cost Structure, Strategic Decisions and Legislation
- By analysing the problem through three different perspectives – 1) Value Chain, 2) Operations and Strategy and 3) Profitability – key success factors (KSFs) are uncovered
- Aviation presents one of the worst returns on invested capital (ROIC) amongst industries and a big dispersion between best and worst performers occurs due to six factors

→ If this industry destroys $18.2 billion per year, why is money still being invested?

3. What are the spillovers of the aviation industry?

- Aviation plays a decisive role in driving global economic growth and contributed with just under $1.8 trillion to global GDP in 2016, generating approximately 29 million jobs. Together with tourism, these industries provided 65 million jobs and its economic contribution represented 3.5% of global GDP in 2016
- As a driver of sustainable development, global aviation contributes to businesses as well as the health and general well-being of people
- The negative environmental impacts of aviation and climate change are the main sources of concern and a growing risk threatening the operations and economic profitability of the aviation industry

→ It is now important to understand the challenges the aviation industry will face in the future and how they can be solved

The commercial passenger airlines segment is the main driver of the aviation industry, with the industry as a whole experiencing shareholder value destruction of $18.2 billion per year due to four factors. Nonetheless, it has a crucial role as a driver of economic growth valued at $2.7 trillion, which ultimately results in a overwhelming net positive contribution to the world economy.

Why are airlines destroying shareholder value and how do they contribute to the world economy?

Executive summary

4. Scalability: a new challenge for the future

- From the previous three chapters it is possible to conclude that the profitability issue within the aviation industry is intrinsic and of difficult resolve, however, the demand for air transport is expected to increase, further strengthening the aviation industry's impact on global GDP growth, generating jobs and driving private consumption
- This sheds light on a new issue: scalability. For which fleet, infrastructure and labour will need to be reinforced to allow the industry to capture the increasing demand in air travel
- Ultimately, a customer journey approach can solve profitability and scalability issues as well as enhance the customer experience

Air transport demand is expected to increase 78% by 2035 and to absorb this growth the aviation industry needs to develop three drivers (fleet, infrastructure and labour). A customer journey approach can be conducted to mitigate profitability and scalability issues while simultaneously enhancing the customer experience.

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1. Which segment is the main driver of the aviation industry and how?

Executive summary

1A. Segmenting the industry

- The aviation industry had global revenues of $1.127 trillion and employed over 30 million people in 2018
- The aviation industry can be broken down into two main areas: freight and passenger transportation
- Freighters dominate the air freight transportation industry accounting for 90% of the revenues
- General aviation (private and recreational flying) is the private transport component of aviation
- Commercial aviation – full-service carriers (FSCs) and low-cost carriers (LCCs) – is the public transport component of aviation
- The commercial airlines segment represents 61% of the whole aviation industry in 2018

1B. Commercial passenger airlines analysis

- The commercial passenger airlines industry analysis conducted will focus on three key components: business model, customers & demand and marketing strategies
- FSCs offer several services to enhance the customer experience which results in a higher price, while LCCs focus exclusively on offering low prices which comes at the cost of very limited services offered
- Commercial passengers can be divided into four segments: efficiency, comfort, price and performance
- FSC customers look for efficiency and comfort with travel agencies organising their travel plans, while LCC customers are price conscious since they organise and book the flights themselves
- FSCs follow differentiated marketing through the high quality and number of services offered, while LCCs follow cost leadership which is achieved by constantly pursuing operating cost reductions

1C. Key success factors

- FSC average price is $112 more expensive but LCCs are slightly more punctual
- Porter's Five Forces analysis main conclusion is that airline bottom line is squeezed due to powerful suppliers

The commercial passenger airlines segment is the main driver of the aviation industry with global revenues of $728 billion and 2.2 trillion revenue passenger kilometres in 2018. Within this segment, full-service carriers (FSCs) focus on providing the best services to attract customers looking for a reliable and comfortable airline which is achieved through differentiation, while low-cost carriers (LCCs) focus on providing the cheapest service to attract price-sensitive customers through cost-leadership.

1A. The aviation industry had global revenues of $1.127 trillion and employed over 30 million people in 2018

Technological innovation and regulatory changes have increased the size and profitability of the industry

The aviation industry

- **Aviation industry** is defined as the global network of aircraft operators, airports, air navigation service providers and manufacturers of aircraft and their components
- It is responsible for connecting the global economy, providing millions of jobs and making the modern, internationally connected way of life possible
- It has grown over the years and is today an important driver of economic growth

Brief history of the aviation industry

- In the late 18th century the first flight attempts were held with lighter-than-air flight using hot-air balloons designed by the Montgolfier brothers
- Followed by un-powered heavier-than-air flight with gliding by Otto Lilienthal in the late 19th century
- Powered flight only started in the beginning of the 20th century with the construction of the first powered aircraft by the Wright brothers
- Since then, the aviation industry has been technologically revolutionized with the introduction of the jet, becoming a viable and important form of transportation around the world

Key facts and figures in 2018*:

$1.127 trillion – Aviation global revenue

54 billion – Kilometres flown by airlines

5.6% – Global GDP supported by aviation

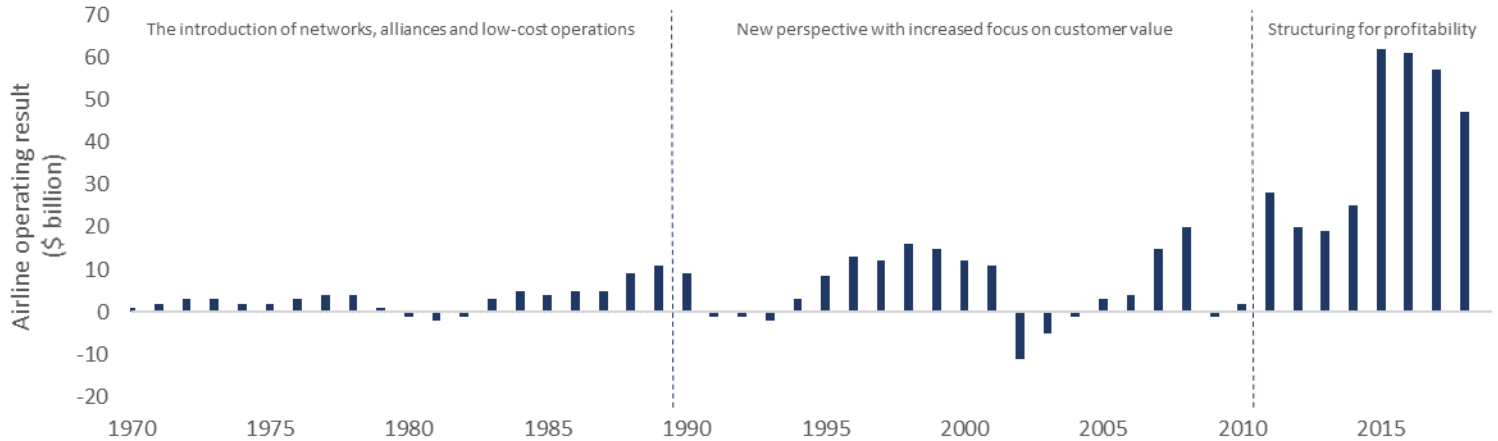
45 091 – Routes served globally in 2017

85 million – Hours flown by airlines

29 million – Jobs supported by aviation worldwide in 2016

*Unless otherwise stated

Only after the deregulation and the development of efficient jets did profitability start to rise:



Source: Airbus

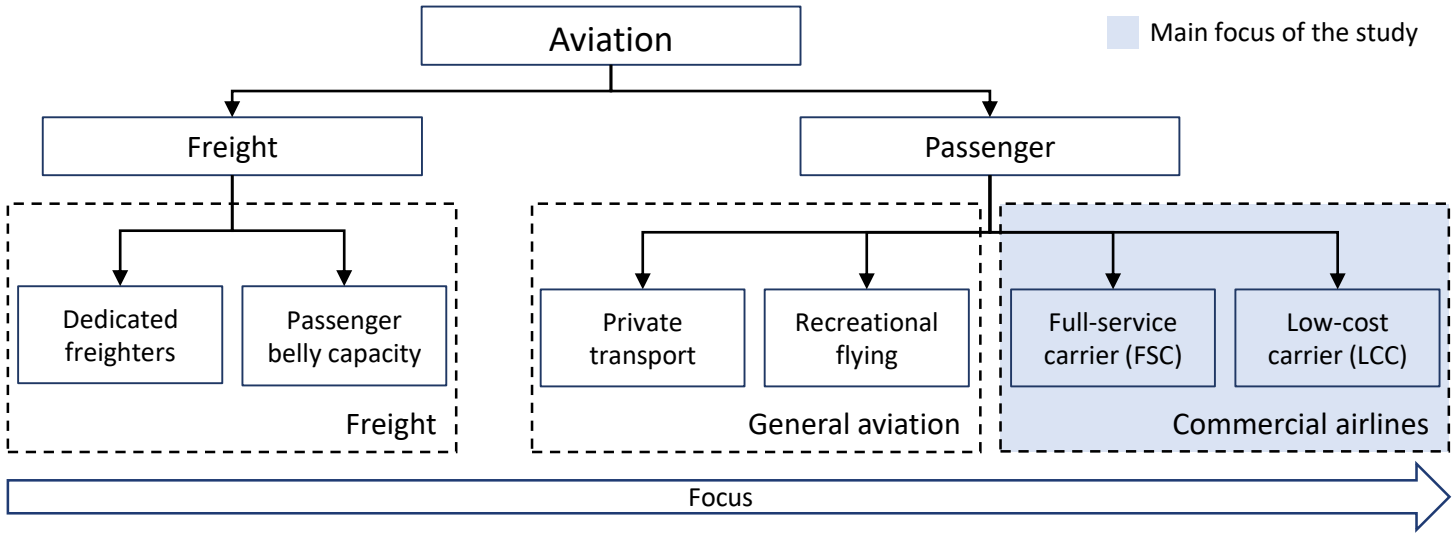
Sources: [1] ATAG; [2] Wittmer et al.; [3] Airbus

1A. The aviation industry can be broken down into two main areas: freight and passenger transportation

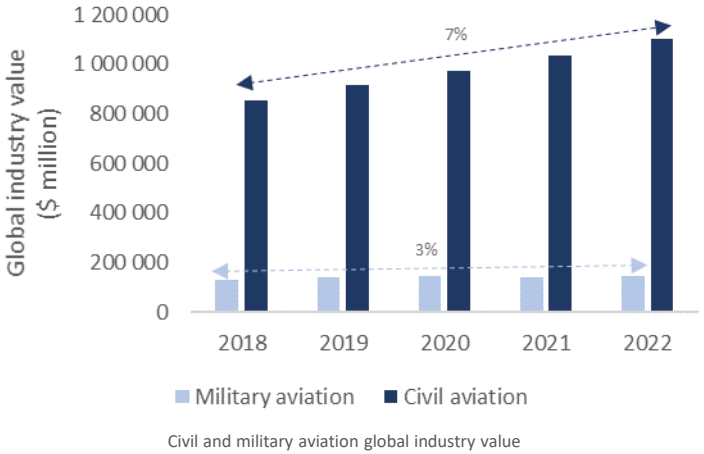
Civil aviation industry has a more significant impact on the global economy compared to military aviation

The aviation industry structure

- The aviation industry has two main pillars: **civil aviation** and **military aviation**
- Due to the very different nature of these two industries and the higher global industry value for civil aviation (as shown below) only civil aviation is within the scope of this study
- The structure of the civil aviation industry is presented on the right and the first breakdown is between the transport of **freight** and **passengers**



Civil aviation is far more valuable than military aviation:



Civil and military aviation global industry value

Source: MarketLine

Freight

- Operating of aircraft to transport goods
- Can be further divided into: **dedicated freighters** and **passenger belly capacity**
- The former includes the use of aircrafts which are solely used for the purpose of transporting goods
- The latter includes the use of spare volume in the luggage compartment of passenger aircrafts to transport goods

Passenger

- Operating of aircraft to transport people
- Can be further divided into: **general aviation** and **commercial aviation**
- The former is the private transport component of passenger aviation (**private transport** and **recreational flying**)
- The latter includes the public transport component of passenger aviation (**full-service carriers** and **low-cost-carriers**)

Sources: [1] ATAG; [4] MarketLine

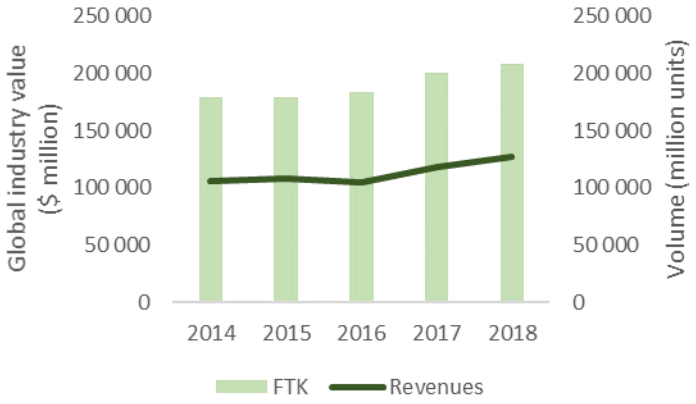
1A. Freighters dominate the air freight transportation industry accounting for 90% of the revenues

61.9 million tonnes of cargo were transported by air resulting in segment revenues of almost $120 billion in 2017

Freight

- **Air freight** is the transport of goods via aircraft
- It is the fastest mode for long-distance freight transport, however, it is also the most expensive
- It is especially valuable for individuals or companies which have urgency in receiving a particular good to satisfy customer needs or to help with inventory management
- Freight can be transported in two ways: through **dedicated freighters** or **passenger belly capacity**

Steady growth in value and volume of air freight transport:



Historical air freight revenues and freight tonne kilometres (FTK)

Source: MarketLine

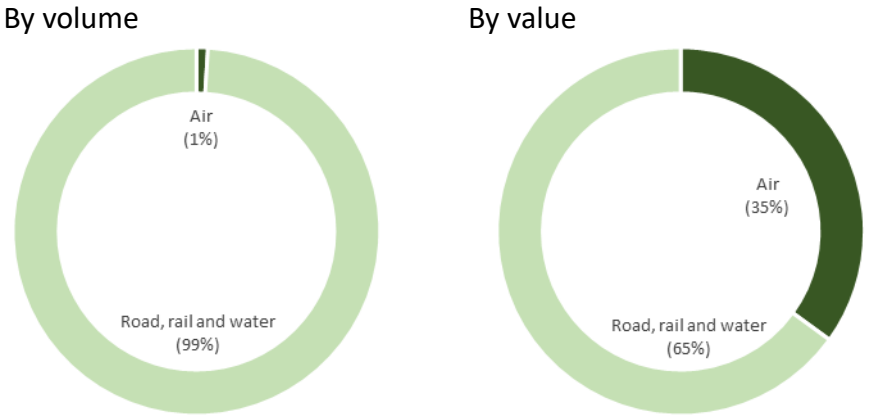
Key facts and figures in 2017:

$6 trillion – Value of cargo handled by air

61.9 million – Tonnes of freight handled by air

255 billion – Scheduled freight tonne kilometres

Air freight volume is low but of high value:



Volume and value of freight by transportation type (2017)

Source: ATAG

Dedicated freighters

- Involves the transport of goods by air in specialized freight aircraft
- Particularly well-suited for transporting high-value goods since they provide direct routing, unique capacity considerations, reliability and highly controlled transport
- Cargo aircrafts offer a higher value of service generating more than **90%** of the total air cargo industry revenue

Passenger belly capacity

- Involves the transport of goods by air in the belly capacity of passenger aircraft
- Extra space in this compartment is used for cargo to capitalize on additional revenue opportunities
- Volume of cargo transported is limited to the space available and include passenger networks which are much broader and often include destinations where cargo demand is minimal

Sources: [1] ATAG; [4] MarketLine; [5] Boeing

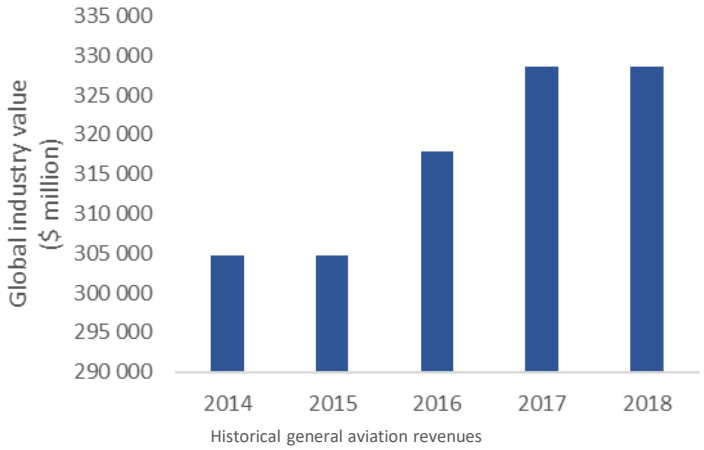
1A. General aviation (private and recreational flying) is the private transport component of aviation

Total revenues of almost $330 billion and employed 1.65 million people in 2018

General aviation

- **General aviation** is defined as all aviation other than military, freight and commercial airlines
- It is the private transportation component of aviation and as such is usually expensive
- The type of aircraft can vary a lot depending on the activity and the number of people transported
- General aviation can be segmented into two areas: **private transport** and **recreational flying**

The increase in value from 2016 onwards is a result of the recovery from the financial crisis:



Historical general aviation revenues

Source: GAMA

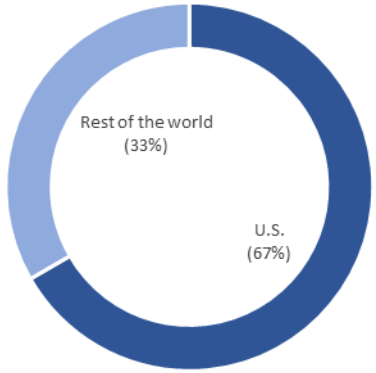
Key facts and figures in 2018:

$328.5 billion – Total revenues

446 thousand – General aviation aircraft flying

1.65 million – Jobs supported by general aviation

Two thirds of passenger traffic comes from the U.S.:



Passenger traffic distribution of general aviation by geography (2017)

Source: GAMA

Private transport

- This segment involves the transport of a small group of passengers in a business or private jet
- Aircraft activities include: corporate aviation, private charters, fractional ownership, and personal travel
- The type of aircraft used can be from a very light jet (max. 9 passengers) to a VIP airliner (max. 220 passengers)

Recreational flying

- This segment usually involves the transport of a single passenger for leisure or sports purposes
- Activities include: recreational flying (powered / powerless leisure flying activities) and air sports (aerobatics and air races)

Sources: [6] GAMA

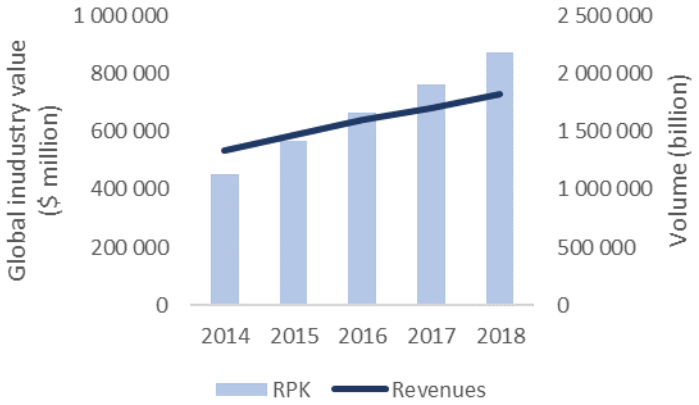
1A. Commercial airlines (full-service carriers and low-cost carriers) is the public transport component of aviation

Almost 9.5 billion passengers were transported resulting in revenues of $730 billion in 2018

Commercial passenger airlines

- **Commercial passenger airlines** is defined by the operating of aircraft to transport passengers
- It is the fastest mode for long-distance passenger transport and in some cases the only viable option
- Depending on the passenger's preferences there are several routes and airlines to choose
- Passengers can fly commercially in two ways: via **full-service** or **low-cost carriers**

Rapid growth in value and volume in the industry:



Historical commercial airline revenues and revenue passenger kilometres (RPK)

Source: MarketLine

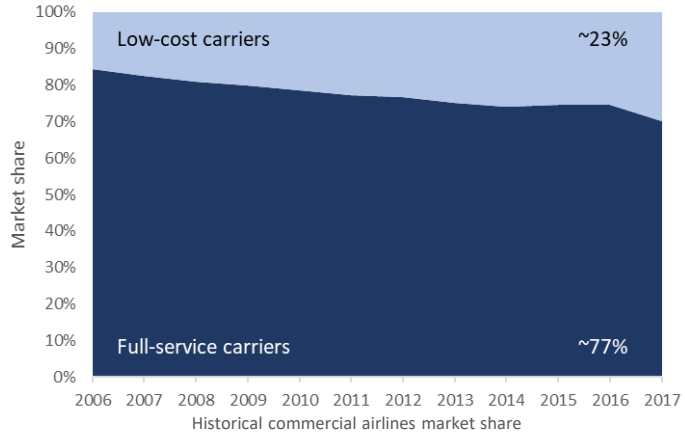
Key facts and figures in 2017:

7.75 trillion – Passenger kilometres

4.1 billion – Passengers carried by airlines

41.9 million – Commercial flights worldwide

Low-cost carriers have been gaining market share over full-service carriers over the last few years:



Source: ICAO

Full-service carrier (FSC)

- Involves the transport of passengers by air via full-service airlines
- Connect large sets of destinations through multiple hubs and typically have a core geographic market in which they are located
- These airlines offer transportation in all travel classes
- FSCs normally have the highest unit revenue as well as the highest cost structure

Low-cost carrier (LCC)

- This segment involves the transport of passengers by air via low-cost airlines
- LCCs typically provide only one travel class
- Are mainly focused on short and medium-haul markets
- Compete on cost leadership since they tend to have the lowest cost structure

Sources: [1] ATAG; [4] MarketLine; [7] ICAO

1A. The commercial airlines segment represents 61% of the whole aviation industry in 2018

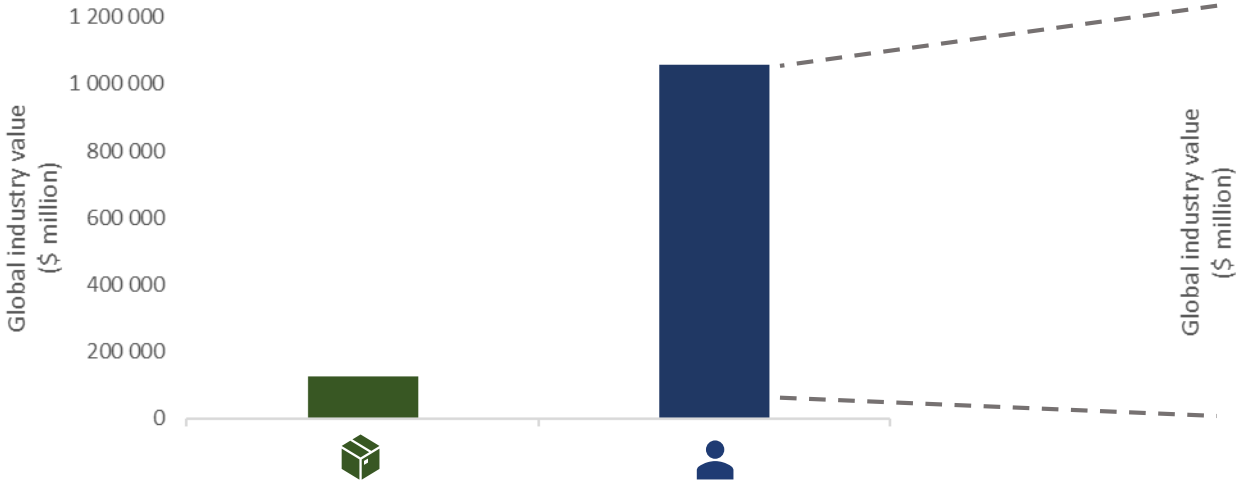
The focus of this study will be on the commercial airlines segment since it represents the most significant share of the global revenues

Focus of the study

It is important to limit the focus of the chapter to the segment which is the most relevant within the overall aviation industry. When analysing the significance of a given segment within an industry it is critical to observe the respective value and volume – revenue passenger kilometres (RPK) or freight tonne kilometres (FTK).

In 2018, passenger aviation had the highest value and volume…

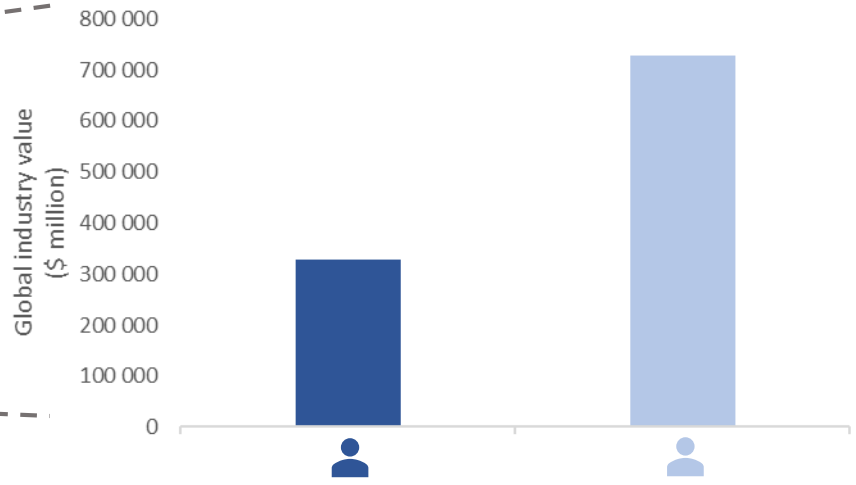
	Freight	Passenger
Value	**$127 billion**	**$1.057 trillion**
Volume	**208 billion FTK**	**2.2 trillion RPK**



Freight and passenger transportation global industry value (2018)

…where the commercial airlines segment was the driving force

	General aviation	Commercial airlines
Value	**$329 billion**	**$728 billion**
Volume	**NA***	**2.2 trillion RPK**



General aviation and commercial airlines global industry value (2018)

From the value and volume analysis conducted it is clear that the main driver of the aviation industry is the passenger aviation segment, more specifically, commercial airlines with 61% of the whole industry and as such this segment will be the main focus of this study.

* No available public data for general aviation volume

Sources: [4] MarketLine; [6] GAMA

1B. The commercial passenger airlines industry analysis conducted will focus on three key components

The business model, customers & demand and marketing strategies will be identified for FSCs and LCCs

The commercial passenger airlines (FSCs and LCCs) will be analysed using the following framework:

Business model

- Network
- Operations & services
- Fare structure
- Key players

Customers & demand

- Customer segments
- Customer journey
- Demand volume
- Demand, ASK and PLF

Marketing strategies

- Marketing strategies
- Value proposition
- Perceptual mapping
- Positioning strategies

1B. FSCs offer several services to enhance the customer experience which results in a higher price…

FSCs made up 70% of the commercial passenger airlines industry resulting in a $477 billion market in 2017

Business model

The availability of connecting flights and the several services offered by the FSCs...

Network

Network structure:

Hub-and-spoke (HS):

+ Several origins and destinations relatively well interconnected with a low number of routes
- Congestion in hubs result in delays and increased turnover times of aircraft, raising airline unit costs

Multi-hub-and-spoke (MHS):

+ More flexible consolidation of traffic in hubs through connecting flights, obtaining an adequate load factor for large aircrafts and efficient flight frequencies
- Need to schedule a high rate of flights between multiple hubs

Geographical network range:

- Mix of short, medium and long-haul domestic and international flights

Operations & services

Aircraft operated:

- Different aircraft types from small regional feeder to a long range widebody aircraft

Services offered:

- Several services offered included in the base fair (e.g. in-flight meals, checked luggage, loyalty programs)

…translate into multiple travel classes and a higher price

Fare structure

Travel class:

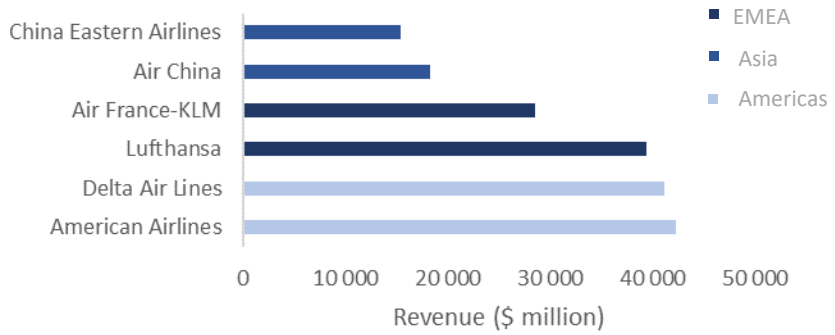
Economy class:

- The lowest travel class of seating in air travel

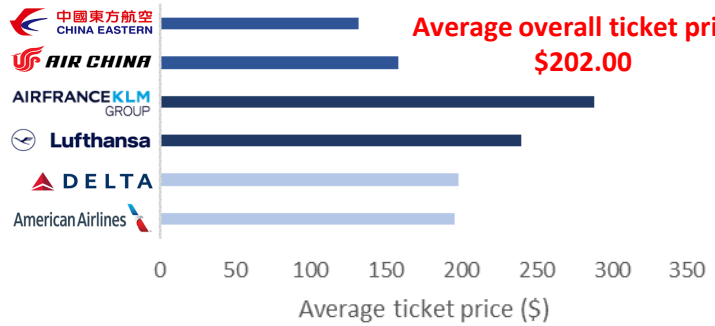
Business class:

- The highest level of service distinguished by the quality of seating, food, drinks, ground service and other amenities
- Business class prices are more expensive and can be more than double the price of the economy class

American FSCs generate the highest revenues while European FSCs are the most expensive:



FSC key players with the highest revenues by geography (2017)



Average ticket price of FSC key players (2017)

Source: Annual Reports

Sources: [8] Annual Reports; [9] Carmona-Benitez et al.; [10] Lordan; [11] DLR

…while LCCs focus exclusively on offering low prices at the cost of very limited services offered

LCCs made up 30% of the commercial passenger airlines industry resulting in a $205 billion market in 2017

Business model

The focus on short-haul flights and the limited services offered by LCCs...

Network

Network structure:

Point-to-point (PP)

+ Lower temporal density due to the non-existence of connecting flights
+ Lower probability of delays, lower peaks of needs of personnel and a lower turnover of aircrafts due to the low temporal density of operations
- Need to implement a much larger number of routes than the HS network to link a similar number of destinations
- Only operate on routes where demand is high enough to have a high load factor
- Limited to short and medium-haul flights since long-haul routes are usually out of reach

Geographical network range:

- Short and medium-haul domestic and international flights

Operations & services

Aircraft operated:

- Homogenous fleet of medium-sized aircraft with high density seating and high capacity utilization

Services:

- Very limited services offered by LCCs (e.g. food and drinks are only available for purchase at prices significantly exceeding typical market value – source of ancillary revenue)

…translate into a single travel class and a lower price

Fare structure

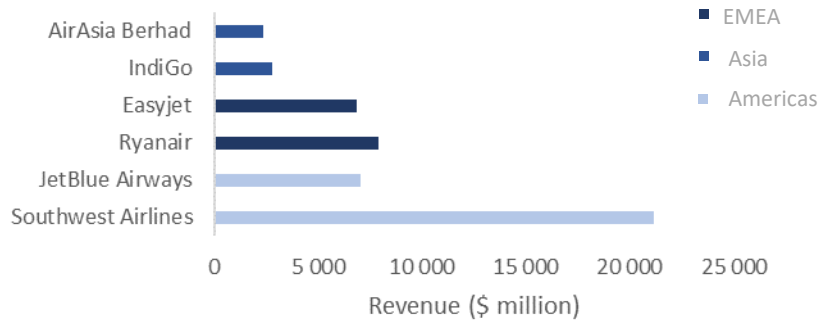
Travel class:

- LCC's usually have only a single service class so there is no price discrimination by travel class

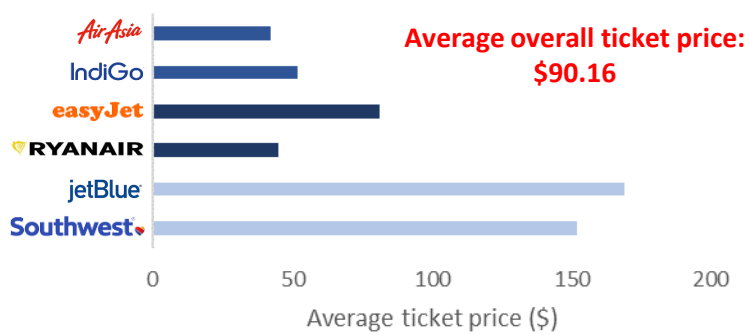
Pricing:

- Low fares are charged due to strong focus on price competition
- Very dynamic pricing with discounts and tickets in promotion

Southwest Airlines is the main driver of LCC revenue while Asian and European LCCs are the cheapest:



LCC key players with the highest revenues by geography (2017)



Average ticket price of LCC key players (2017)

Source: Annual Reports

Sources: [8] Annual Reports; [9] Carmona-Benitez et al.; [10] Lordan; [11] DLR

1B. Commercial passengers can be divided into four segments: efficiency, comfort, price and performance

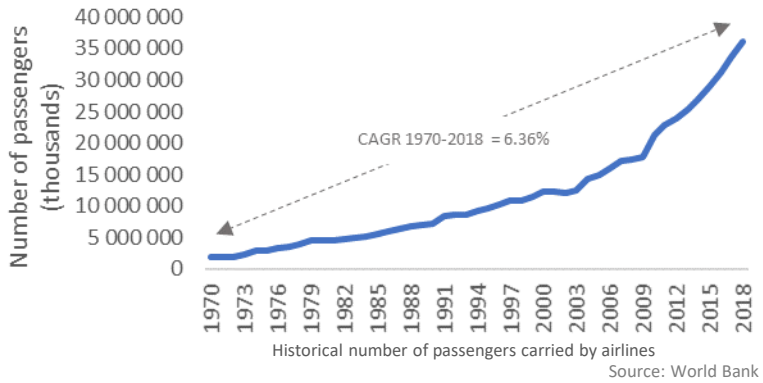
The increase in passengers over the years is a result of the decrease in prices due to deregulation and increased competition

Customers & demand

Historical evolution of demand

- Deregulation in the aviation industry around the 1980s in the U.S. and 15 years later in the European Union, meant that regulations concerning market access, capacities and prices were abandoned
- Customers benefited from lower prices and a rise in number of flights and connections resulting in more options for customers due to increased competition
- The emergence of the first LCCs at the end of the 20th century started a price competition
- Air transportation became more affordable resulting in the demand growth shown below

Demand has increased at a steady rate with the last few years experiencing higher growth rates:



Source: World Bank

Customer segments and preferences according to Teichert et al.'s study

Efficiency

- Relatively low-price sensitivity
- On-time performance (punctuality), flexibility and schedule are the most important features for choices in this segment
- Decision and booking of flights is outsourced for business reasons
- Travel frequency: several times per week
- Demographics: customers with university degrees and working in leadership roles

Comfort

- Very low price sensitivity
- Decision and booking of flights for business and leisure trips are usually made by travel agencies
- Do not use the internet as a booking medium
- Travel frequency: several times per month
- Demographics: elderly customers who work in high-ranking positions

Price

- Very price sensitive
- Planning of trips is done in advance to obtain the cheapest prices
- Not interested in in-flight services
- Travel frequency: 2-4 times a year
- Demographics: at least a high-school educational background and are lower-to-middle management employees

Performance

- Price is important as well as efficiency
- Customers base their choice on a mixture of price and quality
- Extensive research on travel portals
- Book flights by themselves
- Travel frequency: 5-7 times a year
- Demographics: entrepreneurs and lower-to-middle management employees

Sources: [2] Wittmer et al.; [4] MarketLine; [12] Teichert et al.; [13] World Bank

1B. FSC customers look for reliability and comfort with travel agencies organising their travel plans…

Demand for FSCs is increasing at a higher rate than the rise in supply measured by the number of available seats

Customers & demand

FSC customers according to Teichert et al.:

Efficiency:

- Business travellers who cannot afford travel delays and seek the fastest route to their destination. May travel in business class
- Leisure travellers who can afford the services provided by FCCs

Comfort:

- Leisure travellers who seek a comfortable trip with the best service

Customer journey

Planning | Booking | Purchase | Pre-trip | Departure | In-flight | Post-trip

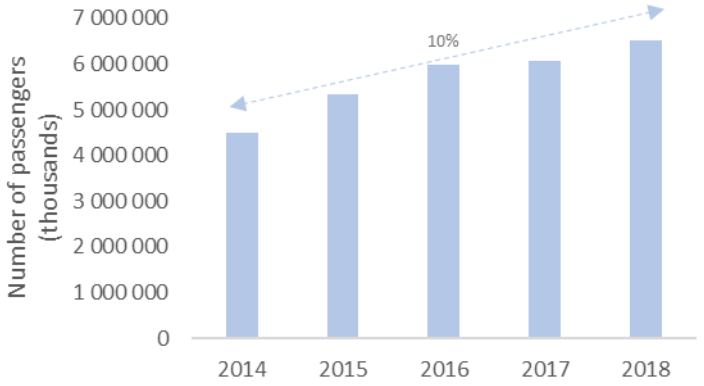
Travel agency

- Planning, booking, purchase and pre-trip check-in are usually outsourced to travel agencies
- Purchase is done directly through the travel agency with the payment of a commission
- Travel agencies can also send pre-trip reminders of the day, time and gate of the flight

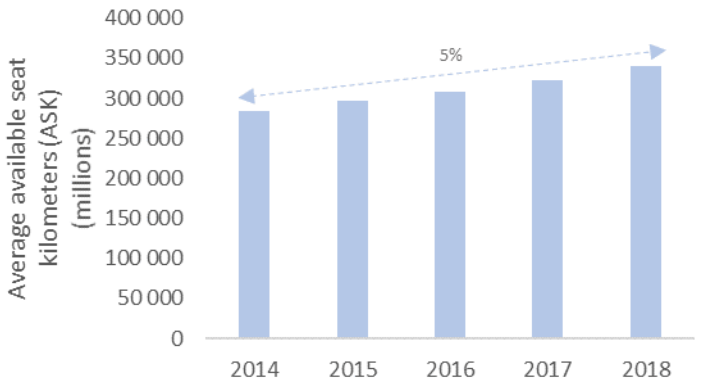
Customer

- Customer ultimately only needs to go through the boarding process and enjoy the services offered by the airline
- Post-trip the customer may review his/her experience based on reliability and comfort

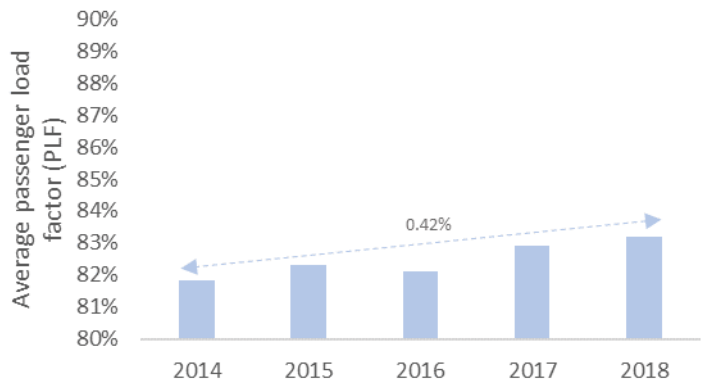
Passenger load factor (PLF) is increasing over the last 5 years, since the increase in demand (passengers) is greater than the increase in supply (ASK):



Historical number of passengers carried by FSCs (average of key players)



FSCs historical average available seat kilometres (average of key players)



FSCs historical average passenger load factor (average of key players)

Sources: MarketLine & Annual Reports

Sources: [4] MarketLine; [7] ICAO; [8] Annual Reports; [12] Teichert et al.

…while LCC customers are price conscious since they organise and book their flights themselves

The demand for LCCs is growing at a higher rate than FSCs as well as having a better utilization of the available seats in each aircraft

Customers & demand

LCC customers according to Teichert et al.:

Price:

- Leisure travellers who pay for the travel expenses themselves and look for the cheapest option to their destination

Performance:

- Leisure travellers who also seek a cheap solution, however, are also willing to pay extra for on-time flights and the necessary connections without having to change airline to reach their destination
- Business travellers with a limited budget

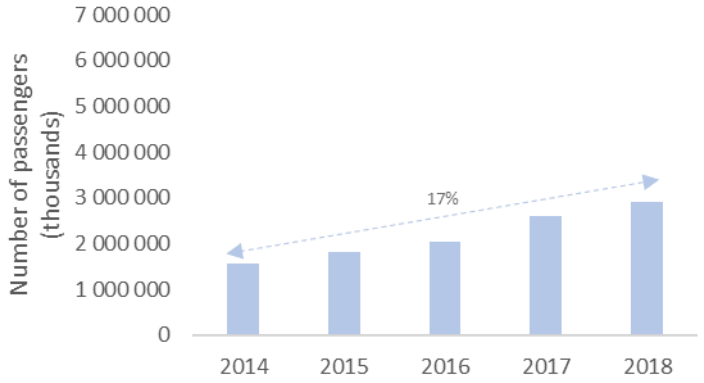
Customer journey

Planning → Booking → Purchase → Pre-trip → Departure → In-flight → Post-trip

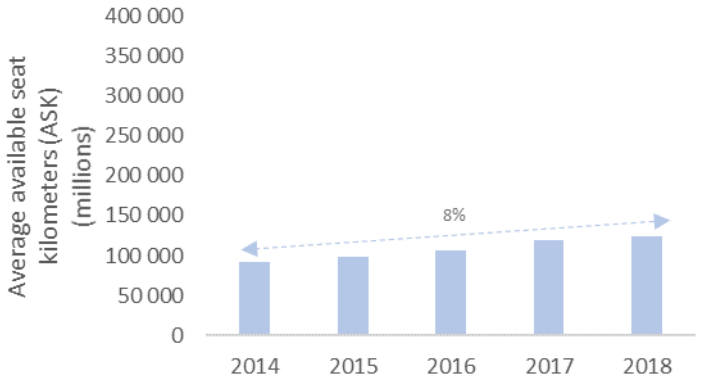
Customer

- Since these customers are price sensitive they might opt to not rely on a travel agency and as such go through the whole process themselves
- For planning and booking, aggregator websites are used to find the cheapest option as well as travel websites to find out the best route
- Purchase can be done directly through the airline's website at designated booking stands
- Little to no services offered by the LCC during the flight
- Post-trip the customer may review his/her experience based on price and performance

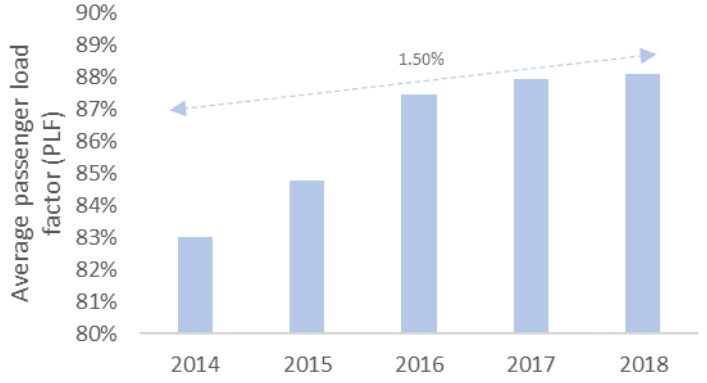
Compared to FSCs, LCC demand, supply and PLF is increasing at a higher rate representing the growth in the LCC segment over the last 5 years*:



Historical number of passengers carried by LCCs (average of key players)



LCCs historical average available seat kilometres (average of key players)



LCCs historical average passenger load factor (average of key players)

Sources: MarketLine & Annual Reports

Sources: [4] MarketLine; [7] ICAO; [8] Annual Reports; [12] Teichert et al.

1B. FSCs follow differentiated marketing through the high quality and number of services offered…

Strategies for FSCs include improving customer service, offering several services, implementing a strong brand and forming alliances

Marketing strategies

Marketing strategy

Differentiated marketing:

- A market-coverage strategy in which an airline decides to target several market segments and designs separate offers for each
- Two travel classes: economy and business class
- FSCs advocate that they offer superior value

Value proposition:

- "More for more" value proposition is implemented by FSCs providing upscale services and charging a higher price to cover the higher costs

American and European FSCs charge higher prices for their increased reliability:

FSC key players perceptual map in terms of price and on-time performance (OTP)

Strategies to implement differentiated positioning

Innovation

- Airlines are constantly looking for ways to improve not only their operations in efforts to become more cost efficient but also their services through innovative features
- Example: China Eastern Airlines is developing a service that will allow customers to give better instructions and feedback on their in-flight meals. Through AI, the airline can better ensure that the tastes and preferences of its customers are kept safe, analysed and applied in the future

Service

- FSCs carry out service differentiation when claiming that they offer several in-flight services as well as punctual and flexible travel
- Example: Lufthansa operates over 60 airport lounges around the world. These lounges are typically only accessible to business class passengers or premium members of the airline. This is a luxury service which Lufthansa provides to passengers so that they can wait for their flights in a more comfortable fashion

Branding

- Customers may perceive a difference between two competing offers based on brand image
- Example: In 2019, Delta Air Lines was the most valuable airline brand in the world with a brand value of $10 105 million. This leading brand value is achieved through Delta's strong culture, communication, enthusiastic employee base and strong business outlook

Alliances

- FSCs are usually part of an alliance composed of several airlines which can greatly benefit its members through economies of scope
- Alliances are formed through: e.g. code sharing and mergers
- Example: Lufthansa founded the Star Alliance to strengthen its network and benefit from economies of scale, scope and density to compete with LCCs

Sources: [8] Annual Reports; [14] OAG; [15] Cheramakara; [17] Qu; [18] W20

…while LCCs follow cost leadership which is achieved by constantly pursuing operating cost reductions

Strategies for LCCs include operating a single aircraft type, secondary airports, reducing aircraft turnover and offering limited services

Marketing strategies

Marketing strategy

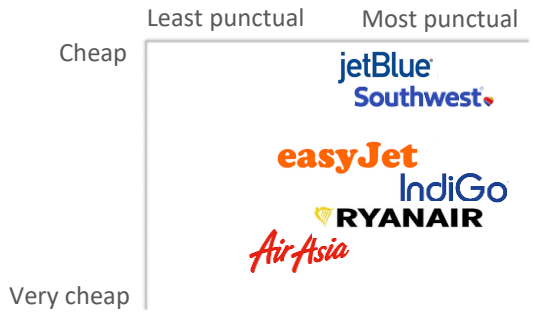
Cost leadership:

- A market-coverage strategy in which an airline goes after a particular market segment
- This is achieved by offering low prices which attract the price and performance customer segments

Value proposition:

- "Less for much less" value proposition is implemented by LCCs meeting customers' low quality requirements at a much lower price

LCCs globally are similar when it comes to reliability with Asian airlines offering the cheapest price:



LCC key players perceptual map in terms of price and on-time performance (OTP)

Strategies to implement cost leadership positioning

Low fleet cost

- LCCs typically operate a single aircraft type
- This significantly decreases maintenance and training costs
- Example: Ryanair only uses the Boeing 737-800 in its aircraft fleet and as such the crew only needs to be trained to operate this type of aircraft and the maintenance is the same for the entire fleet

Low landing fees

- LCCs typically use secondary airports which charge lower fees
- There is less traffic congestion and as a result fuel consumption is minimized
- Example: EasyJet uses the Luton Airport as its London airport. Even though this is a secondary airport and is further away from the city centre than Heathrow Airport it charges lower fees making it cheaper to operate for the airline

Aircraft utilisation

- Heavy emphasis on cost reduction
- Since money is only made when the plane is being operated, turnaround times are reduced to limit the time of the aircraft on the ground
- Example: JetBlue Airways employees usually have multiple jobs. Air stewardesses can also work at the boarding check and as a result the airline saves on employee costs since a role typically done by two employees is done by only one

Limited onboard services

- Checked bags or carry-ons are costly to process at the airport so they are paid in advance (when purchasing flight tickets)
- There is no assigned seating
- No onboard meals since it is costly to stock them and increases aircraft weight
- Example: Southwest Airlines uses its no assigned seating policy to promote that customers can choose where to sit

Sources: [8] Annual Reports; [14] OAG; [15] Cheramakara; [16] Kotler et al.

1C. FSC average price is $112 more expensive but flights are not more reliable compared to LCCs

The higher price charged by FSCs is not being justified in terms of on-time performance and as such customers will switch to LCCs

		Full-service carriers	Low-cost carriers
Go-to-market strategy	Network configuration	Hub-and-spoke & multi-hub-and-spoke	Point-to-point
	Services	Several included in-flight services	Very limited included in-flight services
	Fare structure	Two travel classes: business and economy	Single travel class
	Marketing strategy	Differentiation	Cost leadership
	Key players	American Airlines, Delta Air Lines, Lufthansa, Air France-KLM, Air China, China Eastern Airlines	Southwest Airlines, JetBlue Airways, Ryanair, EasyJet, IndiGo, Air Asia Berhad
Operational results	Revenues (billion)	$477	$205
	Average ASK (millions)	339 647	124 279
	Average PLF	83.2%	88.1%
Key success factors	**Key players average price**	**$202.00**	**$90.16**
	On-time performance	**74.82%**	**75.62%**
	Customer segments	**Efficiency and Comfort**	**Price and Performance**
	Market share	**69%**	**31%**

Figures for 2018

FSCs are on average more expensive than LCCs, however, they are not more reliable, which contradicts Teichert et al.'s study. As such, if no connections are needed and both FSCs and LCCs have exactly the same flights, the LCC will better satisfy the needs of a customer from the Efficiency segment. Hence, if LCCs can make these customers aware that their flights offer a better deal, then LCCs will continue to gain market share from FSCs

→ **Taking this into account, it is no surprise that LCCs are gaining market share over FSCs and this is expected to continue in the following years**

1C. Porter's Five Forces analysis main conclusion is that airline bottom line is squeezed due to powerful suppliers

The establishment of LCCs in the market and the low switching costs for customers are other disruptive forces within the aviation industry

Threat of new entrants

- Limited incumbency advantages
- Easy access to distribution channels
- Benefits of economies of scale make it difficult for the establishment of new players

Threat of substitutes

- Time consuming security measures make trains a short-haul competitive alternative
- Web-conference technology is improving
- Travel can be done without airlines
- Environmental issues challenge air travel

Medium

Competitive rivalry (High)

- **Multiple direct and indirect rivals**
- Growth has been rapid but volatile
- Limited product differentiation; similar company structures
- Low marginal costs per passenger since there are high sunk costs per aircraft
- Significant exit barriers

Medium

Bargaining power of suppliers

- **Aircraft and engine producers are both concentrated oligopolies**
- **Airports have significant power since they are local monopolies**
- Operations at network hubs are controlled by powerful labour unions
- A small concentrated number of firms provide airport services (handling, catering and cleaning), but switching costs are low

High

High

Bargaining power of customers

- **Low switching costs for most customers**
- Air travel is viewed as a standardized product
- Travel is a meaningful share of discretionary spending and as such customers tend to be price sensitive
- Websites increase price transparency
- Buyers are fragmented

→ **Since the main driver of the industry has been identified, it is important to now understand why the aviation industry is destroying shareholder value**

Sources: [19] IATA

Why are airlines destroying shareholder value and how do they contribute to the world economy?

Abstract

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

2. Why is the aviation industry destroying shareholder value?

3. What are the spillovers of the aviation industry?

4. Scalability: a new challenge for the future

Keywords: value chain, strategy and operations, profitability & destruction of shareholder value

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2. Why is the aviation industry destroying shareholder value?

Executive Summary

2A. **Aviation value chain analysis** reveals supplier's strength and outsourcing decision

- Aviation value chain is composed by aircraft manufacturers, infrastructure providers, lessors, service providers, freight and passenger airlines
- Suppliers have high bargaining power over airlines. Airlines are renting more aircrafts and increasingly outsourcing services to service providers
- Although aviation concentrates the vast majority of capital invested, it is one of the industries with the worst economic profit destroying $18.2 billion shareholder value per year

2B. **The importance of strategy & operations for commercial airlines** exposes the complexity of the industry

- Airlines need thorough planning to cope with complexity and increasing air travel demand
- To plan accurately, airlines need to align strategy, capacity and scheduling
- On-time performance is influenced by six factors and depending on performance, leads to strong benefits or costs

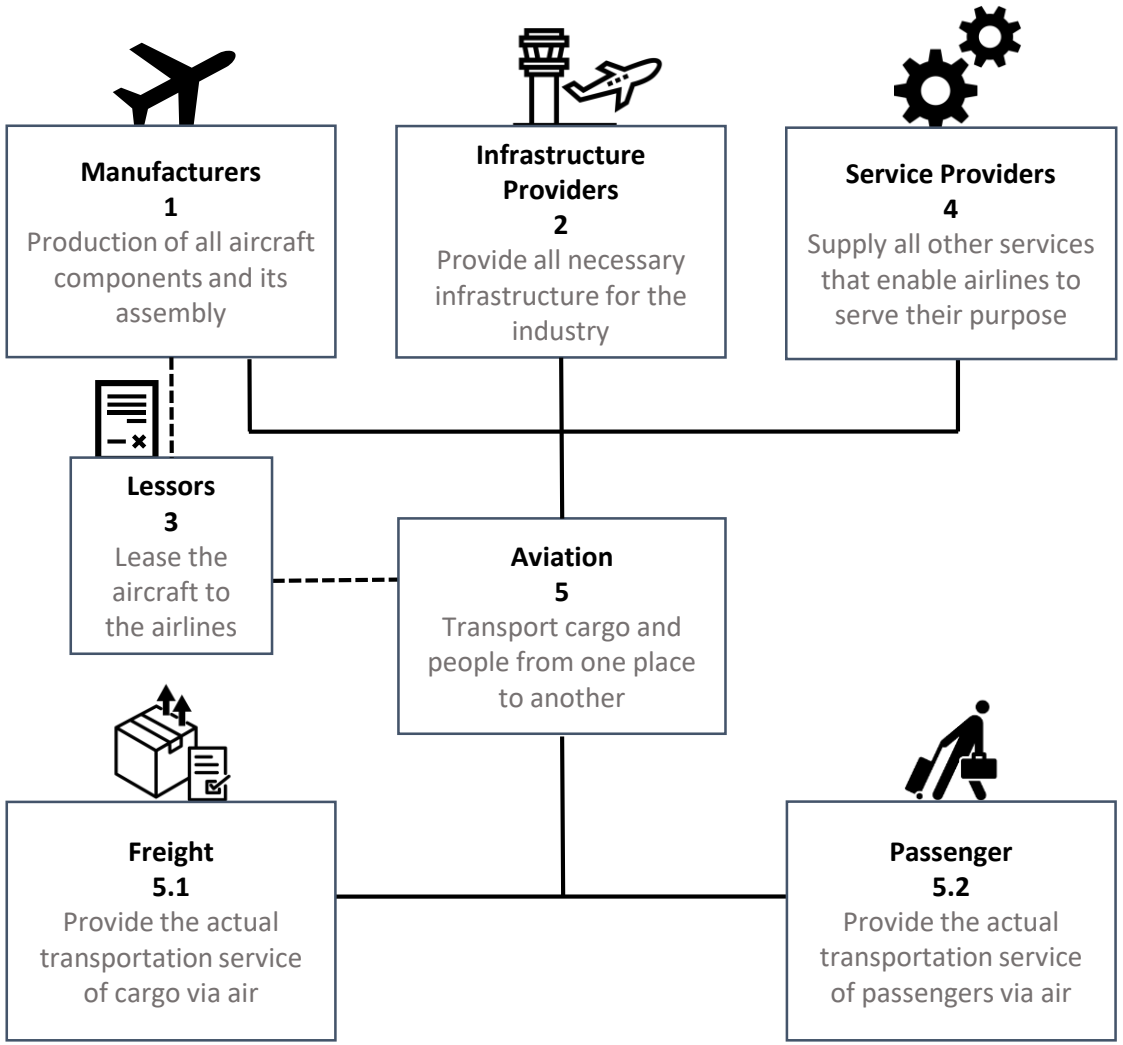
2C. **Commercial airlines profitability analysis** explores the volatile cost structure, yield management decisions and the key success factors

- Industry profit is driven by four primary drivers: ancillary revenue, cargo revenue, passenger revenue and total costs
- From 2009 to 2019 total revenue grew 6.16% per annum and total costs grew 5.66% per annum
- The improvement of profitability led to a historical creation of shareholder value
- When comparing the thirteen airlines that created most economic profit between 2005 and 2015, LCCs contribute to 75% of the $12.455M created
- Six key success factors distinguish best performers
- Airline industry presents the worst ROIC and there is a big gap between best and worst performers due to four key factors

Aviation industry has destroyed $18.2 billion of shareholder value yearly due to four factors. Fierce competition, powerful suppliers and customers with low switching costs exert threatening forces; a volatile cost structure due to fluctuating oil prices which augments unpredictability; strategic decisions regarding yield management and outsourcing of activities might have long term implications; and legislation creates exit barriers.

2A. Aviation value chain is composed of five main categories

Manufacturers, infrastructure providers, service providers and lessors are essential for the transport of cargo and people



1

- **Contributors:** Aircraft Original Equipment Manufacturers (OEM)
- **Revenues:** Aircraft and components sales
- **Main costs:** Raw materials, research & development and wages

2

- **Contributors:** Airports and Air Navigation Service Providers (ANSP)
- **Revenues: Airports** – Aeronautical (aircraft and passenger fees) and non-aeronautical (other) | **ANSP** – contracts with airports and airlines
- **Main costs:** Wages, services / utilities and maintenance of infrastructures

3

- **Contributors:** Leasing firms and other sources of capital
- **Revenues:** Periodic payments (lease)
- **Main costs:** Aircraft purchases and maintenance and interest

4

- **Contributors:** Maintenance repair and overhaul, in-flight services, fuel suppliers, insurance, ground handling services, corporate and external, sales
- **Revenues:** Contracts with airlines or airports
- **Main costs:** Components, research and development and wages

5

- **Contributors:** Freight and passenger airlines
- **Revenues: Freight** per package | **Passenger** per ticket
- **Main costs:** Fuel, aircraft leases / maintenance, wages and airport fees

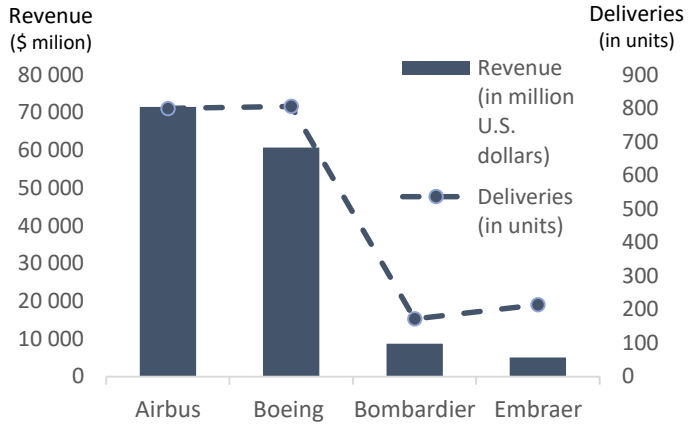
Sources: [1] Tretheway *et al.;* [2] European Commission; [3] BCG; [4] Boeing Financial Statements; [5] Deloitte; [6] MarketLine

2A. Aircraft manufacturers and infrastructure providers have high bargaining power over airlines

Airlines' margins are pressured by powerful suppliers

1. Manufacturers – Aircraft sector dominated by Airbus and Boeing

- **Airbus and Boeing dominate** all sizes of aircraft manufacturing, although there are other suppliers such as Bombardier and Embraer operating in a medium-size segment
- **Aircraft manufacturers** have **huge bargaining power** both **on suppliers and airlines**
- **Capital intensive**, **quality and legacy reliant** industry that works with a significant **delay between order and delivery**
- Technological improvements enable more efficient aircrafts which improve airlines' margins. This allows OEMs to increase prices
- Consolidation in the manufacturer's supplier market is also pressuring margins by increasing prices
- **Engine manufacturers concentrated**: Pratt & Whitney, General Electric and Rolls-Royce dominate the market



Revenue and deliveries of main aircraft manufacturers (2018)

Sources: Statista, Company Reports

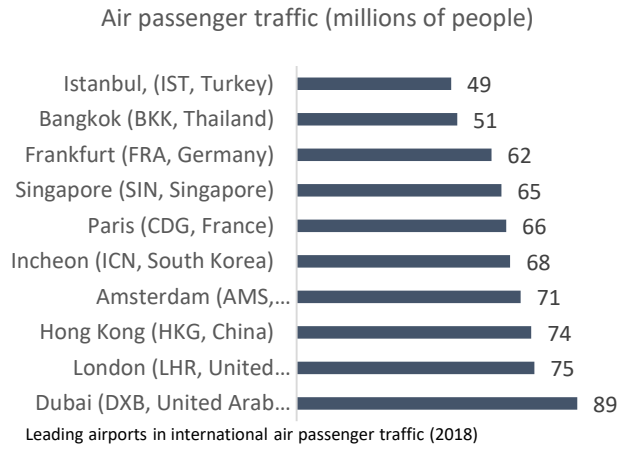
2. Infrastructure providers – Location attractiveness drives bargaining power

Airports:

- **Each city has a small number of airports** and these are run either by large corporations or the public sector
- Airports charge fees to allow airlines to operate. Depending on the **location's attractiveness,** airports' **bargaining power varies** and consequently, the fees fluctuate
- More than 500 cities in the world only have one airport; 66 cities have more than one
- **Customer experience** at the airport **hugely influences their opinion on the airline** itself

Air Navigation Service Providers (ASNPs):

- ANSPs usually have **exclusivity over the airspace** they control, although there are many suppliers of this service
- This power leads to a **high control over pricing** and the **need of tight regulation**
- This industry **requires high investments** of capital and training
- ANSPs are implementing new technologies for air traffic management that will create space for more flights



Leading airports in international air passenger traffic (2018)

Sources: Statista

Sources: [2] European Commission; [7] KPMG; [8] IATA; [9] IATA; [10] Wittmer *et al.;* [11] Airbus

2A. Airlines are renting more aircrafts and increasingly outsourcing services to service providers

By renting and outsourcing more, airlines are able to focus on core activities but may lose on margins

3. Lessors – Proportion of leased aircrafts versus owned is increasing

- Aircrafts are expensive assets – airlines' fleets are composed by owned aircrafts and leased aircrafts
- Capital intensive industry that requires **strong reputation** in order **to create lasting relationships with airlines**
- The **number of companies** performing this activity has been **increasing** – from 118 in 2008, to 153 in 2018
- **Two dominant players**: AerCap with a $34.7 billion fleet and GECAS with a $24.7 billion fleet
- Industry growth fueled by **M&A activity** with the objective of **upscaling** – improve relevance with clients, investors, and suppliers while decreasing costs
- Capital restrictions from airlines and risk restrictions from banks lead to the increase in demand for leasing
- The exponential growth in emerging markets will demand the purchase of 22 730 new aircrafts

Percentage of aircrafts owned by airlines vs leased (2009-2018)

Source: Boeing Current Aircraft Finance Market Outlook, 2019

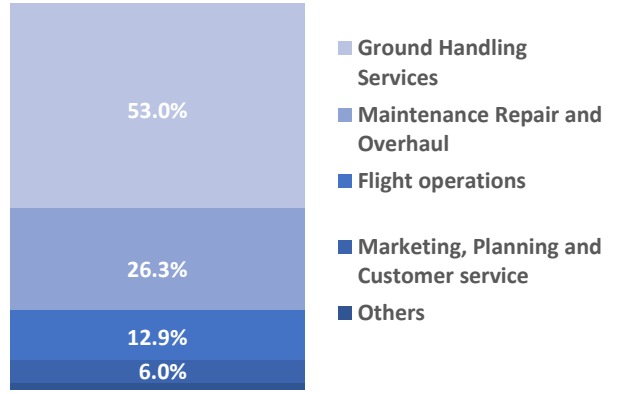
4. Service providers – about 60% of carriers outsource MROs, 50% outsource GHS

Maintenance Repair and Overhaul (MRO):

- **High barriers of entry** due to the knowledge required to perform this activity
- **60% of carriers outsource this service** – OEMs, specialized service providers and other airlines perform this service
- Going through a **consolidation phase** to increase scale and have global presence
- Technology enables better equipment – longer periods without maintenance and better monitoring of aircrafts' condition

Ground Handling Services (GHS):

- Provide a **wide range of services** – passenger, baggage, ramp, cargo and fuel handling. **50% of airlines outsource this service**
- **Swissport**, **DNATA**, **SATS** and **Menzies** are the largest players. **Market is concentrated**, but there are **low switching costs**
- Going through a consolidation phase – players acquire smaller companies that are present in strategic markets



Global aviation service providers' share

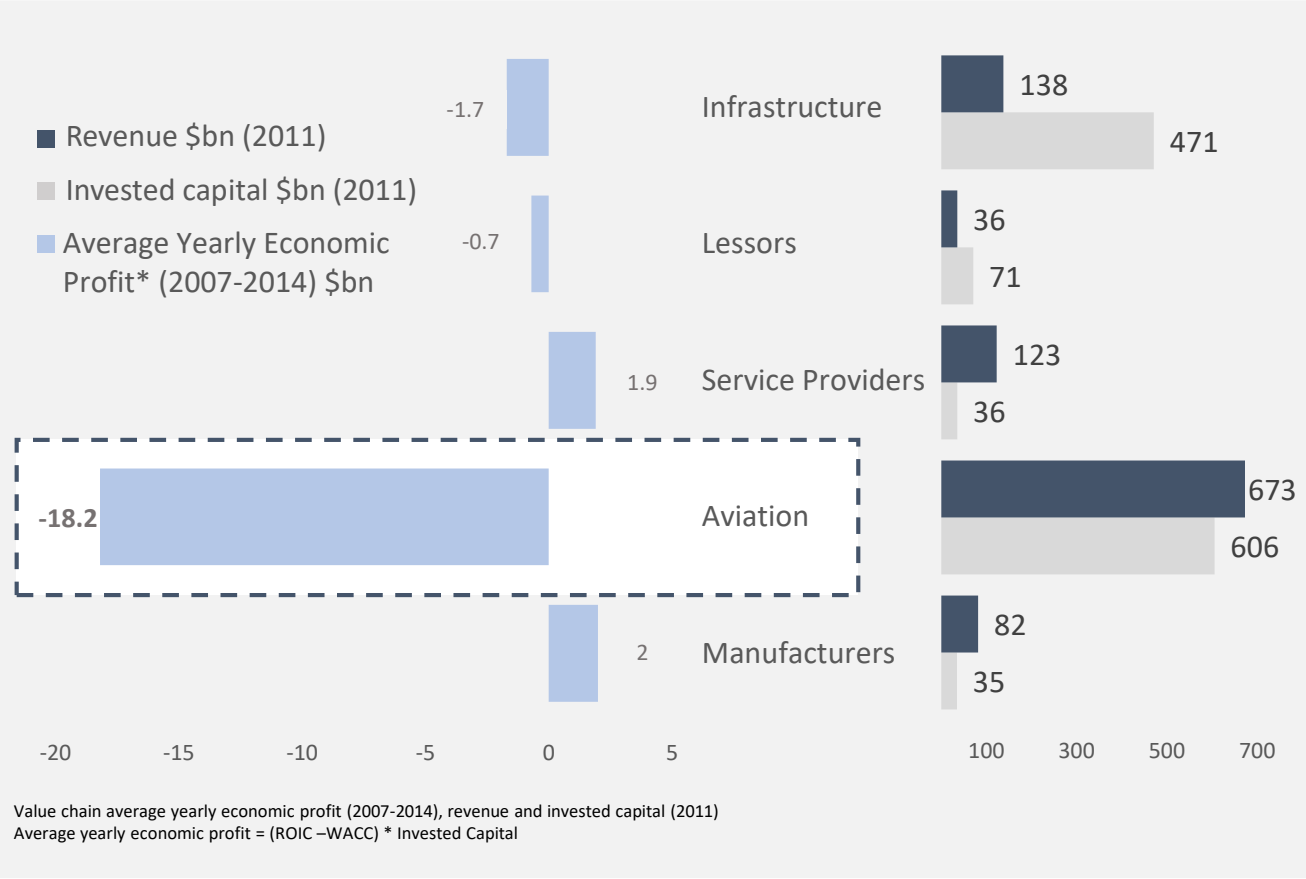
Source: Boeing Commercial Market Outlook, 2019

Sources: [2] European Commission; [7] KPMG; [10] Wittmer *et al.*; [12] Boeing; [13] Flight Global; [14] BCG

2A. Although aviation concentrates the vast majority of capital invested, it presents the worst economic profit

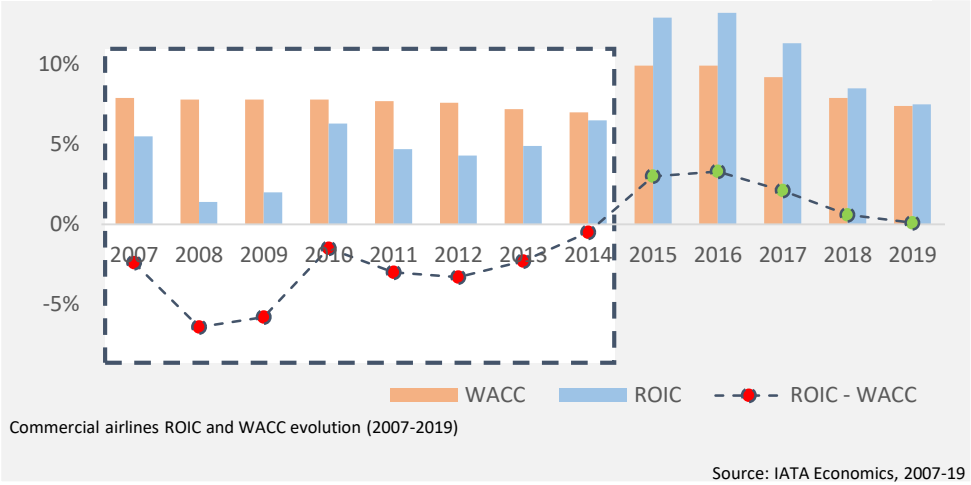
Airlines destroyed $18.2 billion per year of shareholder value

Shareholder value consistently destroyed in aviation; Majority of capital invested in aviation and Infrastructure



Value chain average yearly economic profit (2007-2014), revenue and invested capital (2011)
Average yearly economic profit = (ROIC –WACC) * Invested Capital

2015 was the first year with positive economic profit



Commercial airlines ROIC and WACC evolution (2007-2019)

Source: IATA Economics, 2007-19

- From 2007 to 2014 airlines destroyed $18.2 billion of shareholder value per year
- 2015 was the first year the industry presented a positive economic profit
- After five historically positive years, industry goes back to break-even values

Sources: [8] IATA; [10] Wittmer *et al.;* [15] IATA; [16] Acemoglu *et al.;* [17] Financial Times

2B. Airlines need thorough planning to cope with complexity and increasing air travel demand

A linear growth in air travel demand causes an exponential impact on operations' complexity

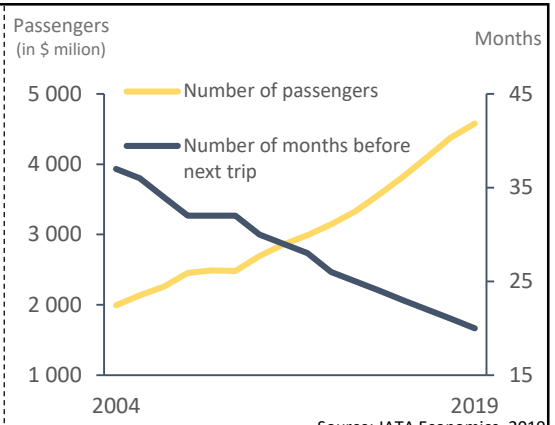
1 Increasing Air Travel Demand

Since 2000

- Traffic increased **2.4x**
- The number of pair cities increased more than **2x**
- Ticket price decreased to about **0.5x**

Now

- **400** commercial flights take-off per hour

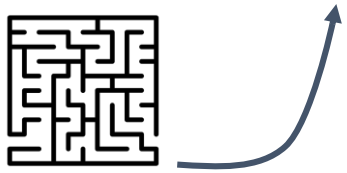


Source: IATA Economics, 2019

A linear growth in air travel demand …

… increases exponentially the complexity of airlines' operations

2 Complexity



Airlines perform a service that can take up to five years of preparation
Main activities:

- Network and fleet
- Crew
- Maintenance
- Airport processes
- Customer and product
- Corporate

Complexity is due to:

1. Integration (people, processes, functions and technologies)
2. Dependence on external factors (weather, air traffic control, infrastructures and seasonality of demand)
3. Mix of durations and time-frames of the processes

Need to plan in order to align capabilities with passenger demand

Sources: [11] Airbus; [18] IATA; [19] Alan *et al.*; [20] Boeing; [21] IATA

2B. To plan accurately, airlines need to align strategy, capacity and scheduling

According to the competitive strategy, airlines use scheduling strategies to extract the best possible results from their capacity decisions

Planning

Time

Competitive Strategy

> *"Competitive strategy is the search for a favorable competitive position in an industry, the fundamental arena in which competition occurs"*
> Michael Porter, 1985

Align competitive strategy to obtain three advantages:
(Kilinc, Oncu and Tasgit, 2012)

- Cost leadership
- Service quality
- Customer satisfaction

Capacity Decisions

> *"Capacity strategy tries to achieve the best match between the airline's long-term capabilities and predicted long-term passenger demand"*
> Alkhatib and Migdadi, 2018

Define five criteria related to capacity:
(Alkhatib and Migdadi, 2018)

- Fleet size
  Fleet diversity
- Number of employees
- Number of seats
- Number of airports, countries, cities and continents

Scheduling and Operational Decisions

> *"Airline scheduling affects the airline's ability to avoid delays, save costs, generate revenues, take more passengers, and thus satisfy their customers"*
> Faust, 2017

Four steps to perform when scheduling:
(Faust, 2017)

- Schedule design
- Aircraft maintenance routing
- Fleet assignment
- Crew scheduling

Sources: [22] Saranga *et al.*; [23] Alkhatib *et al.*; [24] Faust *et al.*; [25] Porter *et al.*; [26] Kilinc *et al.*

2B. On-time performance is influenced by six factors and depending on performance, leads to strong benefits or costs

On-time performance is the crucial non-monetary measure to evaluate airline performance

On-Time Performance (OTP): On-time flights are the flights that arrive or depart under 15 minutes of their scheduled arrival / departure times

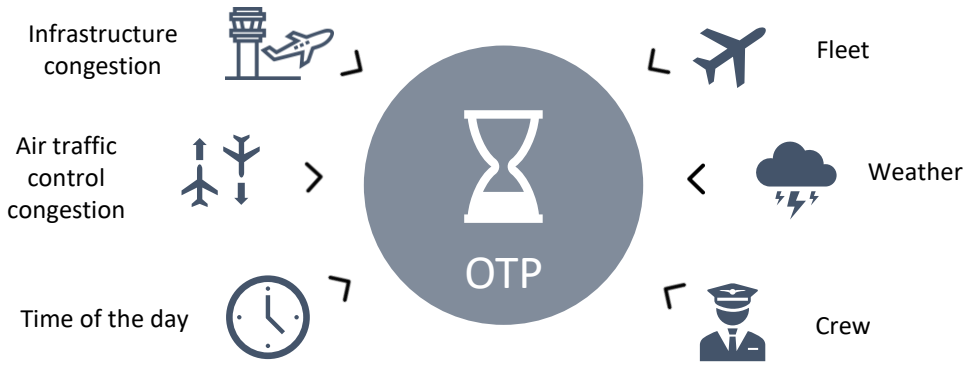
- The **first** U.S. domestic **flights** of the day average **80% OTP**, while the **last flights** average only about **50% OTP**
- One delayed aircraft in the morning can lead to more than 70 delayed planes later in that same day
- By **saving one minute** on the ground per aircraft, it is possible to **save from $5M to $10M a year** due to freed aircraft time and hidden costs from all operations

	Competitive Strategy 1-5 Years	Scheduling 6-12 Months	Scheduling 1 Month	Scheduling 72 hours	Operational Decisions Day of Execution
Network	Network Strategy	Schedule Buffers	Flexible Capacity		
Fleet and Routing	Fleet Plan	Designated Lines	Aircraft Routing	Swap Decisions	
Maintenance	Long-Term Strategy	Scheduling		Overnight Plan	Swaps, parts
Crew		Workforce Planning	Crew Scheduling	Reserves	
Airports		Workforce Planning	Staff Rostering		Turn Execution

Commercial airlines operations

Source: BCG

Determinants of OTP



Consequences of OTP

Benefits
(from good performance)

- Customer satisfaction
- Cost control (aircraft and employee efficiency)
- Culture and employee morale (better OTP increases predictability and, therefore, employee work-life balance)

Costs
(from bad performance)

- Direct – Payment of compensation, rebooking expenses, overtime pay to employees
- Indirect – Customer experience, brand, downstream effects (one delay may take a lot of time to recover)

Sources: [22] Saranga *et al.;* [27] IATA; [28] Amadeus; [29] Suzuki *et al.;* [30] BCG; [31] BCG; [32] OAG

2B. For example: competition, internal decision and customers influence route planning

Airlines pursue the maximization of total profit, not of route profit

Case in Point

Route planning influencers

Many factors have influence on route planning, it is not just about profitability.

> *"There are some flights that are very profitable, some flights are barely profitable and some flights that we operate that are unprofitable"*
>
> **Mike Minerva**
> Vice-President of Airport Affairs of American Airlines

1. Competition
2. Internal decisions
3. Customers

1 Competition

Supply analysis

- Is there enough demand for an extra supplier?
- How will competitors react?
- If there is a very important route that a competitor operates, it can be worth it to fly that same route even though it is not profitable *per se*

2 Internal decisions

- **Opportunity cost analysis:** Is it the most profitable route to add? Can the same plane generate more revenue elsewhere?
- **Available resources:** Is there available fleet / crew to cover this new route?
- **Operational logistics:** Comply with legislations, negotiate contracts with airports and service providers
- **Other interests:** Increase on-time performance (reliability)

3 Customers

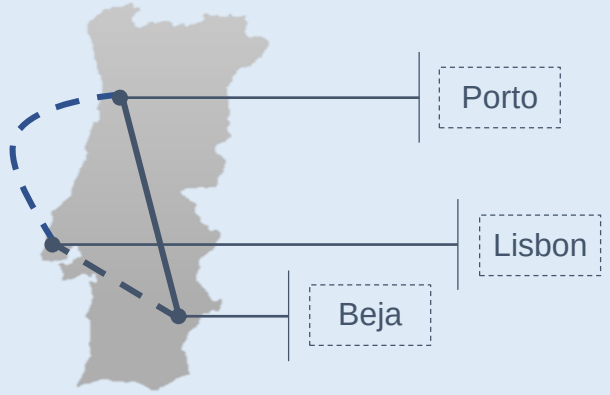
Demand forecast

Airlines can use their own data or purchase it. Overall, two factors are weighted:

- **Customer willingness to pay:** How much are people willing to pay to fly there?
- **Origin and destination:** How many people want to fly from one place to another?

New route: Porto – Beja (using own data)

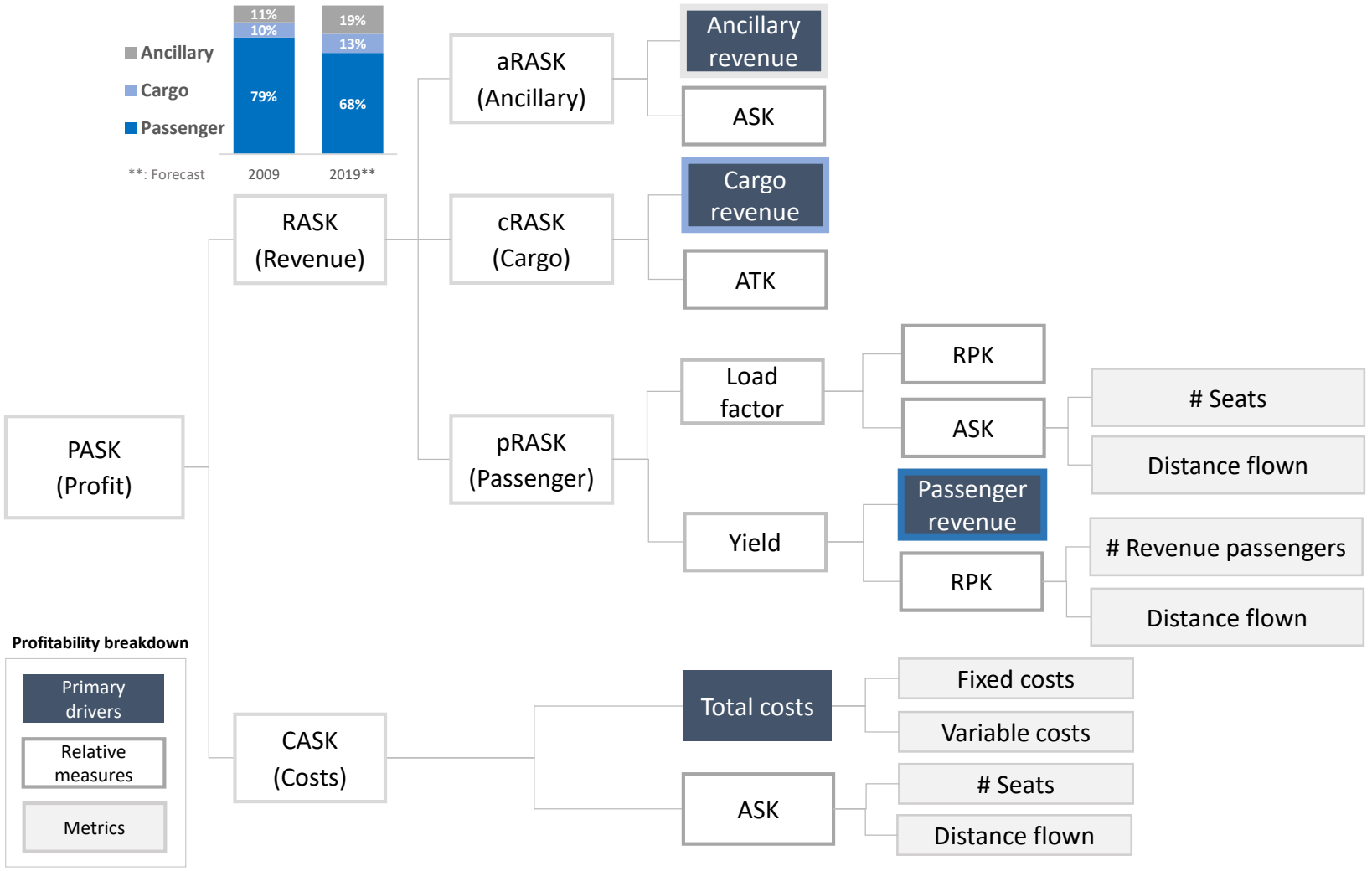
Analyze the number of people that fly from Beja to Lisbon in order to have a flight to Porto



Sources: [28] Amadeus; [30] BCG; [31] BCG

2C. Industry profit is driven by four primary drivers: ancillary revenue, cargo revenue, passenger revenue and total costs

When analysing the full industry, only the primary drivers are taken into consideration



Profitability drivers

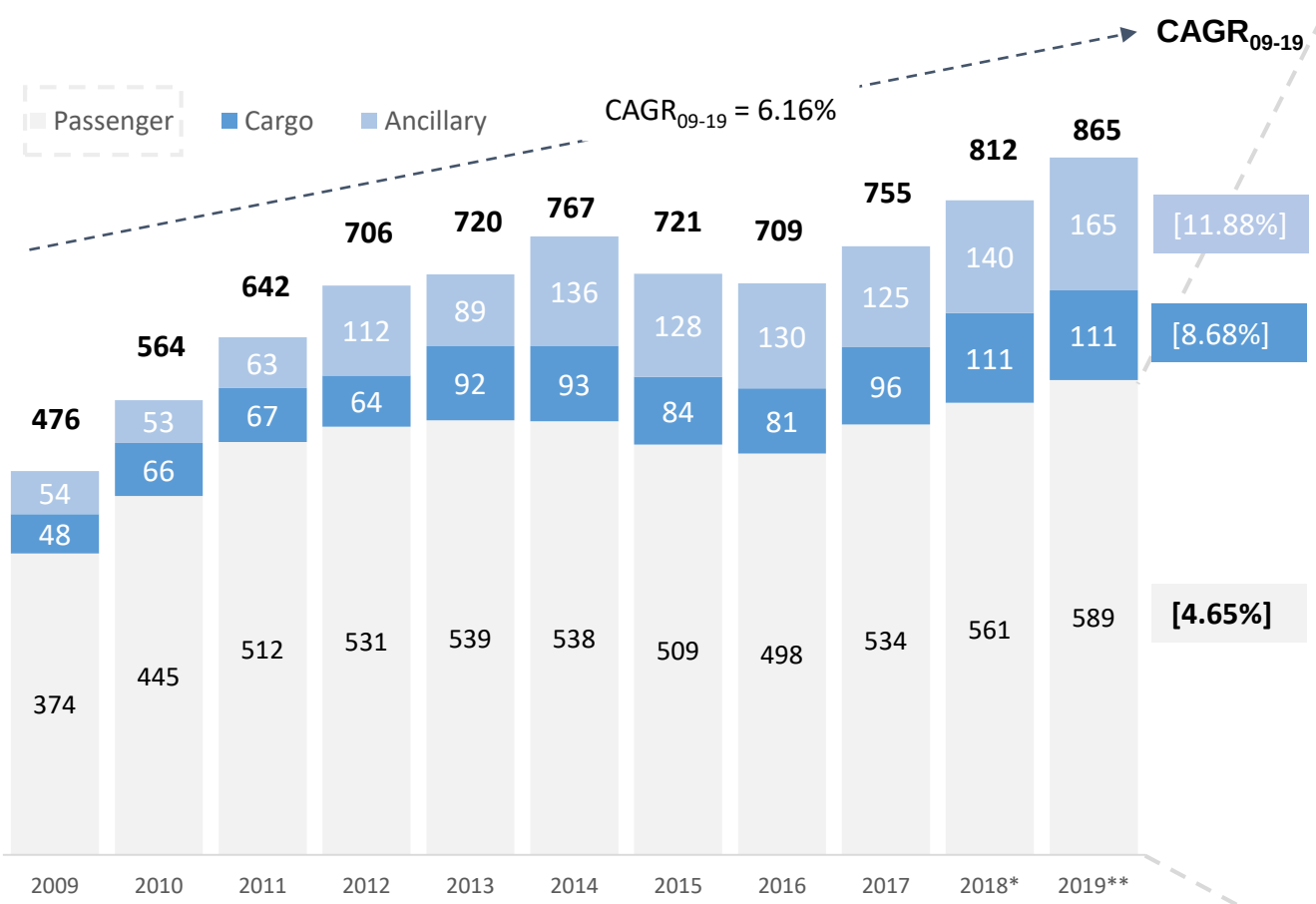
- **Ancillary revenue:** consists of every source of revenue besides ticket and freight sales. In the last ten years, it has almost doubled in importance for airline total revenue
- **Cargo revenue:** revenue from the transport of cargo
- **Passenger revenue:** driven by two factors
  - **Load factor:** represents the percentage of the overall capacity being used by passengers. It is calculated by dividing the capacity that earns revenue (RPK) by the total capacity (ASK)
  - **Yield:** represents the average fare received by passenger kilometer. It is calculated by dividing total ticket revenue by the RPK
- **Total costs:** Fuel, labour, aircraft financing and maintenance as well as airport fees are the biggest costs of airlines

Sources: [33] BCG; [34] Oliver Wyman

2C. From 2009 to 2019 total revenue grew 6.16% per annum (p.a.), reaching $865 billion in 2019

A 0.72% p.a. increase in load factor was enough to cover a 3.4% p.a. decrease in yield which led to a 4.65% p.a. increase in passenger revenue

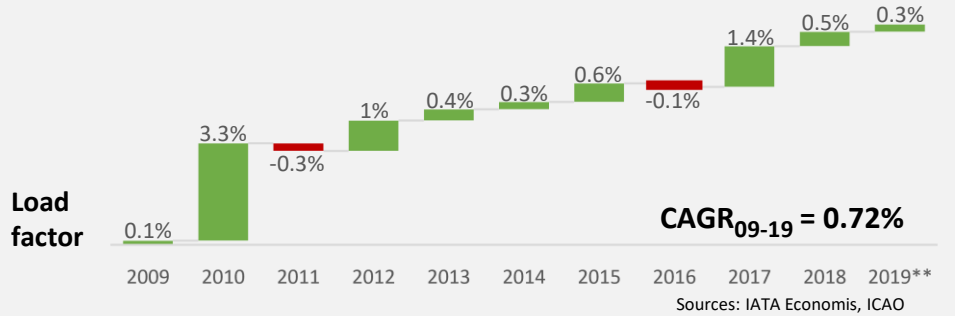
Although in 2015 and 2016 there was a revenue decrease, total revenue still grew 6.16% p.a.



Commercial airlines revenue evolution 2009-2019
Values in $ billion
*: Expected; **:Forecast

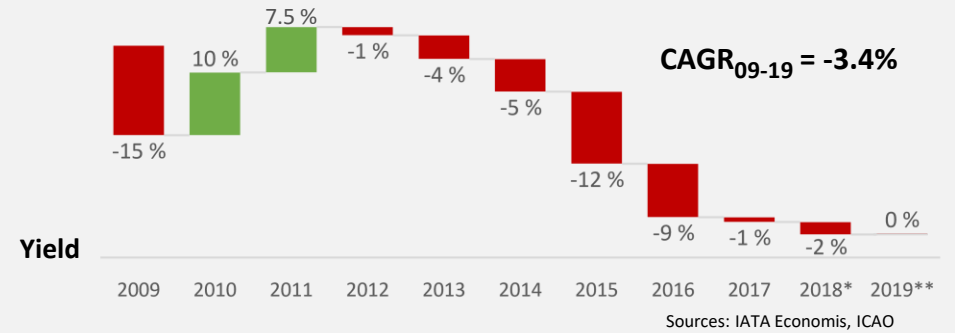
Sources: IATA Economics

Load factor has increased 0.72% p.a. while yield has decreased by 3.4%



Sources: IATA Economis, ICAO

Airlines are capitalizing on air travel demand increase by consistently improving the load factor. It is now on record high levels as a result of improved scheduling and customer experience, and optimized yield management systems



Sources: IATA Economis, ICAO

Maintains last decades' tendency of decreasing average ticket prices. The preponderance of the LCC business model was crucial to enable this trend

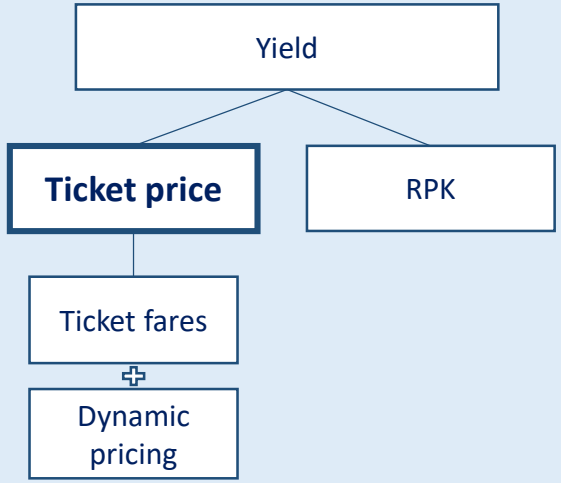
Increasing yield is not a synonym of higher profits as it might have a negative effect on load factor

Sources: [35] Oliver Wyman

2C. Ticket fares define ranges of prices that fluctuate based on dynamic pricing

Constant price changes for the same service leads airlines to price closer to marginal costs more often

Ticket price



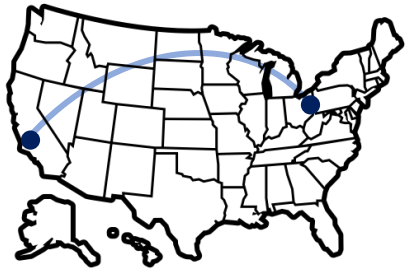
Ticket price depends on six factors

- Time until flight
- Season
- Number of available tickets
- Minimum stay requirements
- Oil prices
- Competitors pricing

LAX to JFK

Source: David Richardson, Director of Government Affairs, Southwest Airlines

Key figures:

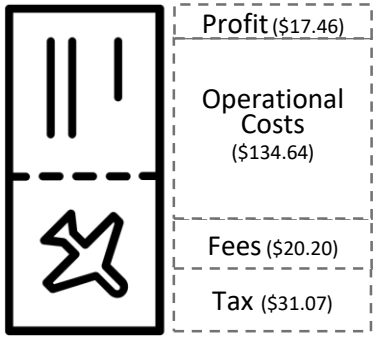


3.5M passengers per year

5 airlines flying the route

8 prices from $129 to $472

Base Fare ($204 ticket) decomposed:



66% (fuel and labour)

$4.5 x 2 (facility charge) + $5.6 x 2 (security fee)

7.5% (ticket tax) + $4.1 x 4 (segment tax)

Pricing:

B, B, N, G, V, L, M and K are ticket fares that have a number of tickets associated. When the airline sells all the tickets in fare B, it starts selling tickets from fare N

Within these fares, dynamic pricing accounts for changes in the six factors and alters the ticket price

Ticket Fares for Economy class:

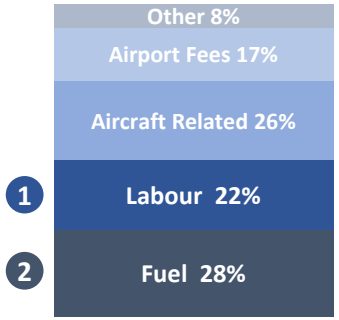
B	B	N	G	V	L	M	K
$129	$144	$159	$204	$269	$318	$357	$472

Sources: [36] Doganis *et al.*

2C. Total costs grew 5.66% p.a. although a decrease between 2014 and 2016 was enabled by a drop in oil prices

Fuel, aircraft related costs and labour represent the greatest share of airlines' costs

Cost structure



Sources: IATA, Doganis (2010)

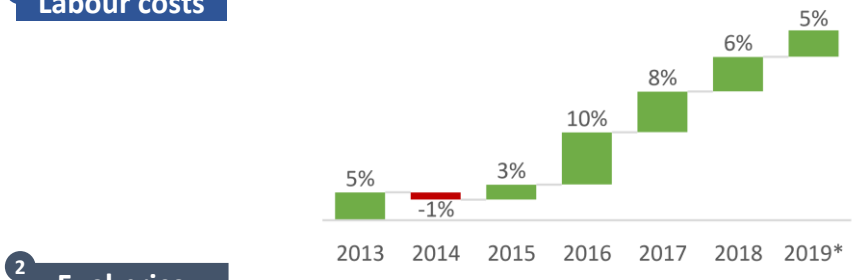
Fuel, aircraft related costs and labour compose the largest share of total costs. Fuel price is very volatile, labour costs have increased for the past six years and aircraft related costs have been stable

2 Fuel Price:

- ↘ Decreased in 2009, from 2013 to 2016 and in 2019
- ↗ Increased from 2010 to 2011 and from 2017 to 2018

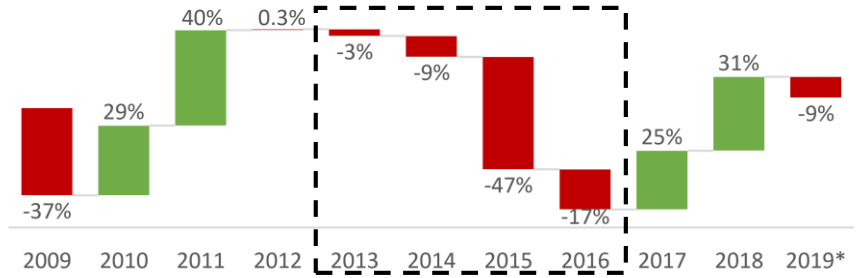
Cost evolution

1 Labour costs



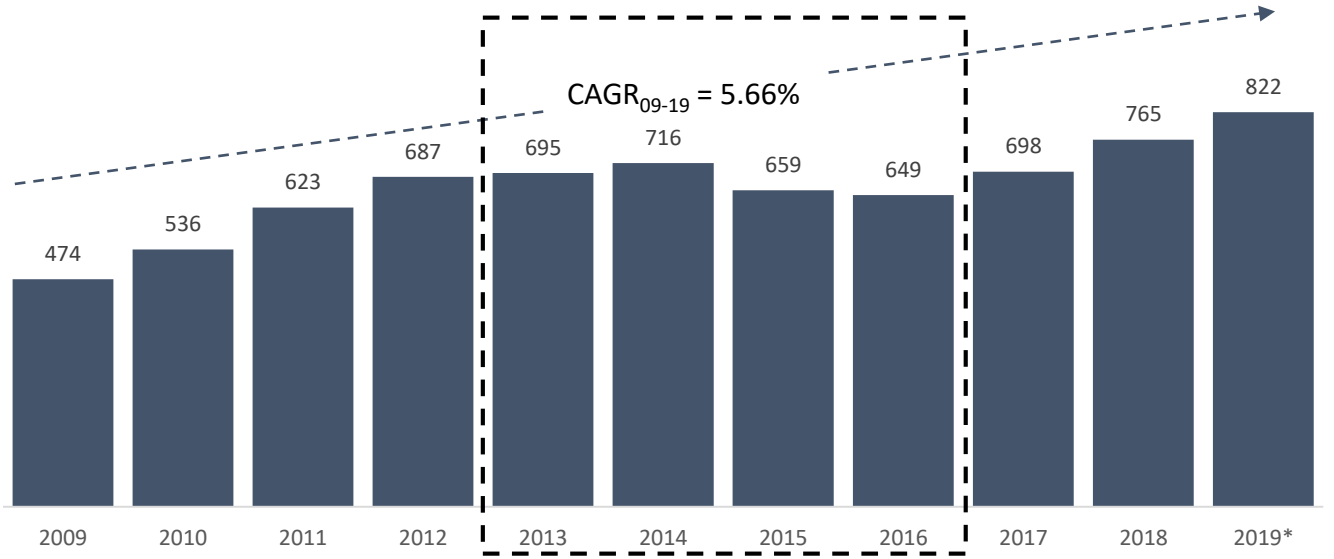
Sources: IATA Economics

2 Fuel price



*: Expected

Sources: Statista



Commercial airlines total costs evolution 2009-2019
Values in $ billion

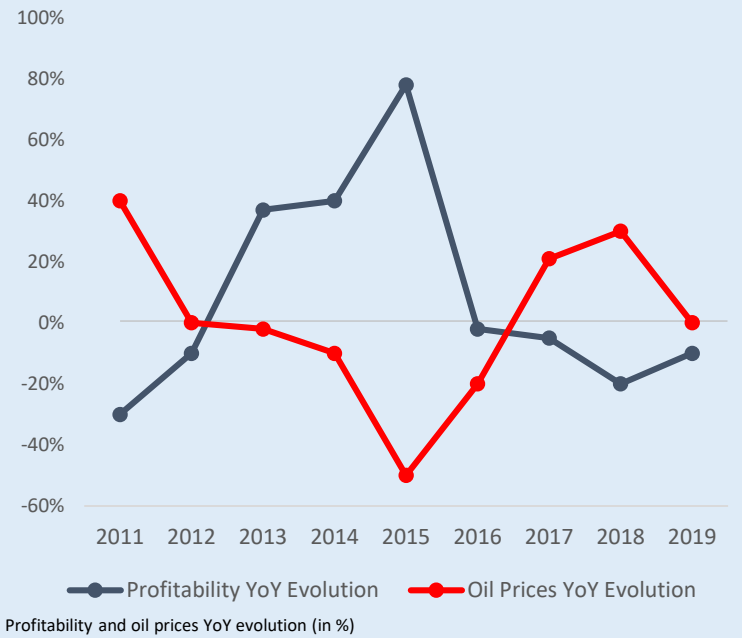
Sources: IATA Economics

Sources: [36] Doganis *et al.*

2C. Revenue growth outpaced costs growth allowing historical creation of shareholder value

The decrease in oil prices was very important for this historical moment

Strong negative correlation between oil prices and profitability



Profitability and oil prices YoY evolution (in %)

Sources: Airbus Commercial Market Outlook 2019

Revenue growth outpaced costs growth

$CAGR_{09\text{-}19}$ = 6.16%

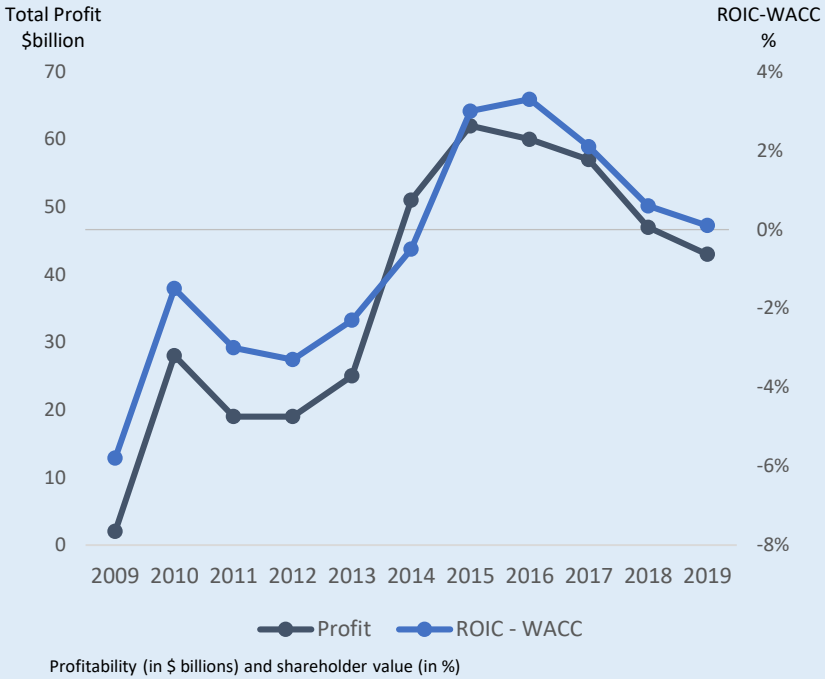
Revenue

$CAGR_{09\text{-}19}$ = 5.66%

Costs

- 2014 – 2016 peak decrease in oil prices led to a decrease in total costs
- Revenues were able to outpace costs which increased profitability
- Shareholder value was finally created for the first time in 2015
- Shareholder profit around 0% in 2019

Profit growth enabled historical creation of shareholder value



Profitability (in $ billions) and shareholder value (in %)

Sources: IATA Economics

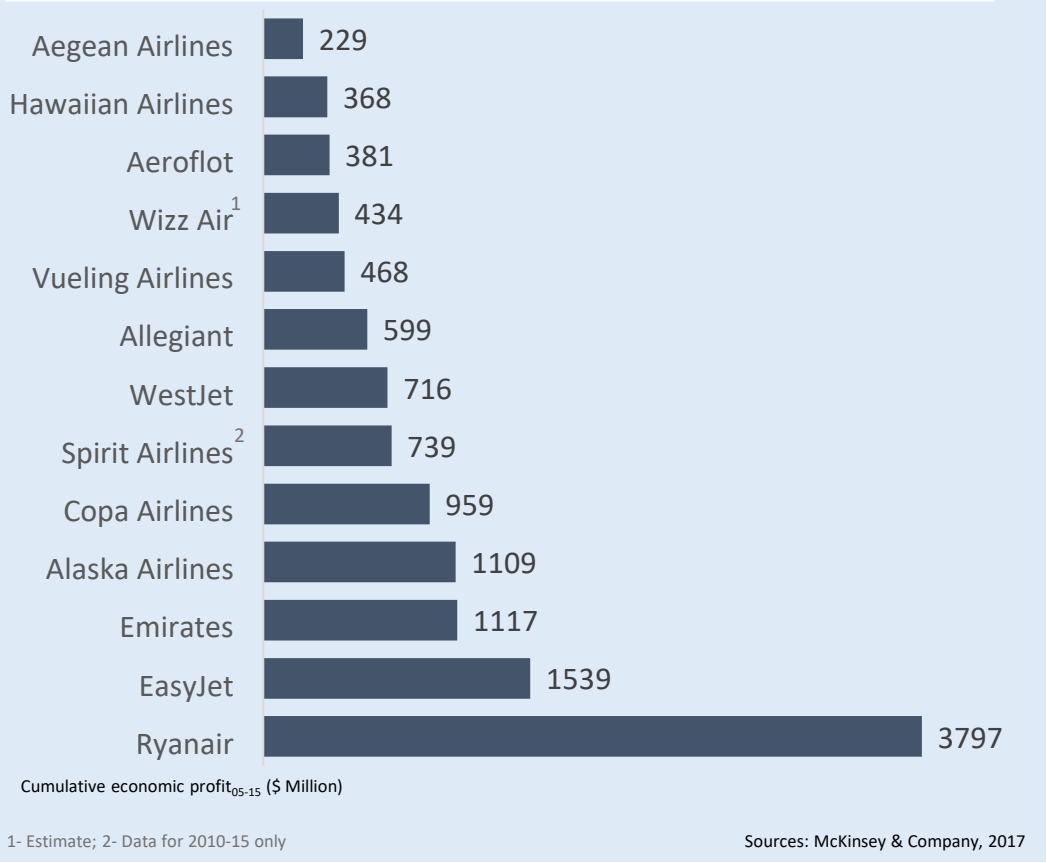
Is the industry going back to unprofitability?

2C. Thirteen airlines created $12 455 million of economic profit

Within the thirteen airlines that created most economic profit, LCCs represented 75% of total value

Airline cumulative economic profit

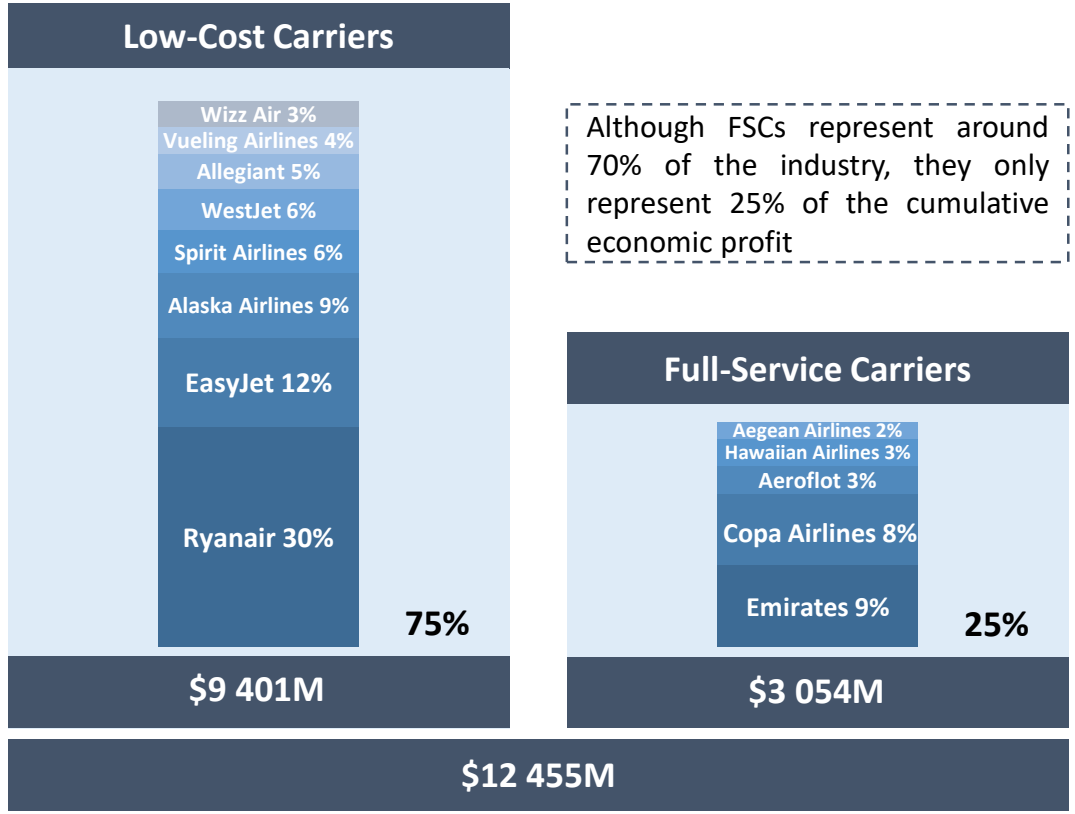
Few airlines earned their cost of capital between 2005 and 2015



1- Estimate; 2- Data for 2010-15 only

Sources: McKinsey & Company, 2017

LCCs created more value for their shareholders



Although FSCs represent around 70% of the industry, they only represent 25% of the cumulative economic profit

Sources: [37] McKinsey & Company

2C. Six key success factors distinguish best performers

These factors allow the thirteen companies to create value for their shareholders

Key success factors

Emphasis on short-haul	**Flying shorter distances** • Amongst the most profitable airlines, 8 out of 13 emphasize short-haul • Under a wide range of assumptions, a plane generates less revenue per dollar of capital employed in long-haul, than in short-haul
Brand and loyalty	**Create a brand that people care about** • Invest in brand presence: products, promotion, service and reputation • This leads to a more direct distribution and improves the management of client relationships
Lower capital needs	**Using smaller amounts of capital** • Using older fleets enables better-quality revenues (less flights, better schedules), but as fuel prices drop and interest rates rise, it becomes less profitable
Cost advantage to peers	**Having the lower costs is not the goal** • The goal must be creating cost advantage regarding competitors • Using cheaper labour markets, lean manufacturing or driver-based planning
Strong organizational structures	**Make sure the airline is cohesive** • Management team aligned • People spend time with their teams to drive performance, not debating causes • Every employee knows his role • People are accountable for their actions
Privileged sources of revenue	**Offer a unique value proposition** • Attractive schedules to certain destinations • Using their own capacity (hubs, fleet, geographic markets) to create uniqueness • Quality of service

Sources: [14] BCG; [38] McKinsey & Company

2C. Airline industry presents the worst ROIC and a wide spread between best and worst performers due to four key factors

Threatening forces, a volatile cost structure, strategic decisions and legislation led to the destruction of shareholder value

Why is the industry destroying value?

Key (in)success factors

Threatening forces

- Fierce competition drives prices down
- Suppliers have high bargaining power
- Customers have very low switching costs and are price sensitive

Volatile cost structure

- Fuel has represented 40% of total costs in peak times and 10% in low times
- Fuel prices are negatively correlated to profitability

Strategic decisions

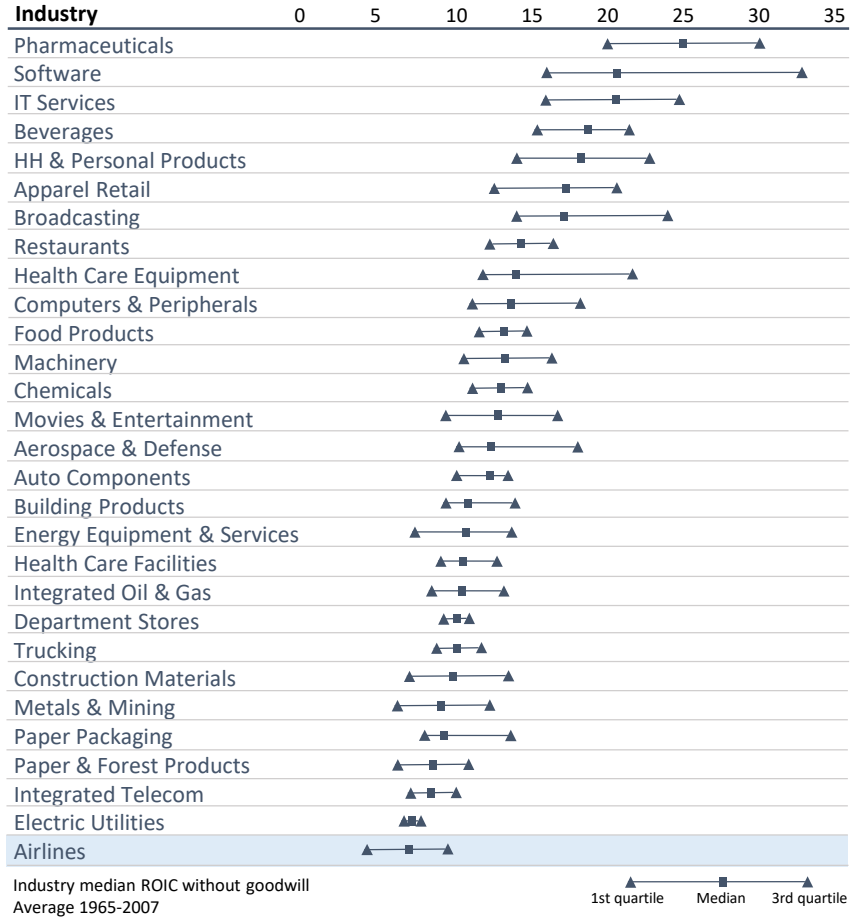
- Yield management
- Outsourcing of activities

Legislation

- Price setting and capacity increasingly liberalized while strategic decisions regarding areas of operation still restricted
- Exit barriers and government subsidies constrain market forces of letting the best grow and worst improve or leave

→ Why is money still being invested?

Airlines rank last in ROIC and show the gap between performers



Industry median ROIC without goodwill
Average 1965-2007

Source: McKinsey for IATA (2013)

Sources: [9] IATA; [39] PwC

Why are airlines destroying shareholder value and how do they contribute to the world economy?

Abstract

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

2. Why is the aviation industry destroying shareholder value?

3. What are the spillovers of the aviation industry?

4. Scalability: a new challenge for the future

Keywords: spillovers, economic growth, sustainable development & environmental impact

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia(UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), PORLisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and PORNorte (Social Sciences DataLab, Project 22209).

3. What are the spillovers of the aviation industry?

Executive summary

3A. The aviation industry as a driver of economic growth

- The economic impact of aviation and tourism is classified as direct, indirect or induced
- Aviation and tourism are complementary industries that have been growing at similar rates over the past 14 years
- There is a causal link between tourism and economic growth
- Aviation plays a decisive role in driving global economic growth and contributed with just under $1.8 trillion to global GDP in 2016, generating approximately 29 million jobs
- Tourism contributed with approximately $898 billion to global GDP in 2016 and generated almost 37 million jobs
- The EMEA region was the biggest driver of global GDP contribution in 2016 but it was the Asia-Pacific region that generated more jobs
- Together, these industries generated 65 million jobs and its economic contribution represented 3.5% of global GDP in 2016

3B. The aviation industry as a driver of sustainable development

- Global aviation is a driver of sustainable development, contributing to businesses and the general well-being of people
- Aviation provides a connection to remote regions worldwide, provides a fast and safe transport of people and cargo and also provides access to quality education
- Aviation plays a key role in the process of working towards a sustainable world development

3C. The environmental impact and risks of the aviation industry

- Noise, air pollution and greenhouse gas emissions (GHG) are the main sources of concern regarding the environmental impacts of aviation
- GHG emissions from aviation have more than doubled since 1990 and air pollution keeps increasing
- Several measures have been put in place to control and monitor emissions and noise from the aviation industry
- Climate change is a growing risk threatening the operations and economic profitability of the aviation industry

Even though airlines destroyed shareholder value until 2015, they had a crucial role as drivers of economic growth and played a key role in globalization and world development. The economic and social spillovers of the industry have always outweighed its economic profitability and negative environmental impact.

3. Spillovers of the aviation industry – economic growth, sustainable development and environmental impact

Even though airlines have destroyed value for over 70 years, they managed to thrive, driving economic growth and sustainable development

"Airlines and the wider air transport supply chain clearly create substantial value for consumers and the broader economy. That value creation is why, over the past forty years, air travel has expanded ten-fold and air cargo fourteen-fold, compared to a three to four fold rise in world GDP. Yet over this period airlines have only been able to generate sufficient revenues and profit to pay their suppliers and service their debt. There has been nothing left to pay investors for providing equity capital to the airline industry"

Tony Tyler
Director General and CEO International Air Transport Association (IATA)

ROIC < WACC

- **Until 2015, the airline industry was destroying value, as it had never achieved a return on invested capital (ROIC) greater than its weighted average cost of capital (WACC)**

Despite destroying value and performing poorly when compared to other industries, airlines still attracted outside capital from investors and most of the airlines managed to thrive under difficult times and economic cycles

In order to measure the real significance of the aviation industry in today's world, it is important to determine the impact it has on other industries and its role in driving economic growth and social development. The downsides such as the negative environmental impact and risks associated with the industry should also be analysed

Economic Growth

Sustainable Development

Environmental impact and risks

Sources: [1] IATA; [2] McKinsey

3A. The economic impact of aviation and tourism can be classified as direct, indirect or induced

The economic impact of both aviation and the tourism industry is analysed on a global scale

Regions

World | EMEA | Asia Pacific | Americas

	Direct	Indirect	Induced
Aviation	**1) Employment** • Flight-related (e.g. flight crew, maintenance and check-in staff) • Airport facilities (e.g. restaurants, retail stores) • Airport operators (airport maintenance and management) • Manufacturing (aircraft) • Air navigation service providers (ANSPs)	**2) Supply chain activity** • Construction companies (airport construction) • Suppliers (e.g. aircraft fuel, components used in aircraft) • Manufacturers of products sold at airport retail stores • Other services (e.g. call centers)	**3) Consumer purchase power** • Spending of people who are either directly or indirectly employed by the aviation sector supports additional jobs in other industries (e.g. banks, consumer goods, manufacturers)
Tourism	**1) Employment and tourists spending** • Jobs in industries supported by the spending of tourists (accommodation, transportation, entertainment and attractions)	**2) Investment spending and employment** • Capital investment (within all sectors directly involved in the tourism industry) • Government spending (tourism promotion and visitor services) • Supply chain effects (impact of purchases from suppliers) • Jobs in industries supplying tourism	**3) Consumer purchase power** • Measures GDP and jobs supported by the spending of people who are either directly or indirectly employed by the tourism industry

Sources: [3] ATAG

3A. Aviation and tourism are complementary industries that have been growing at similar rates over the past 14 years

Tourism benefits from the aviation industry and aviation benefits from tourism growth

Aviation and tourism are two industries that complement each other

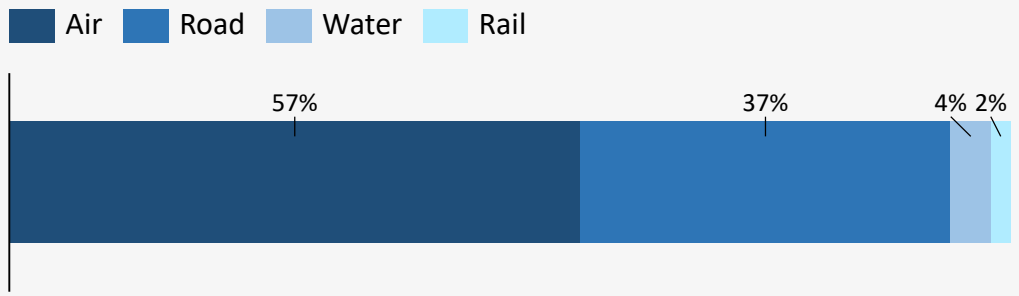
- Tourism benefits from the aviation industry due to airlines unique accessibility – air transportation is the preferred mode of transport for international tourists, who value its mix of benefits such as availability, cost, quality and facilities when compared to other options such as road, water or rail transportation
- Aviation benefits from tourism growth, as an increasing number of passengers increases the demand for flights (the service offered by airlines)

The number of international tourist arrivals and the number of flights has been growing at similar rates over the past 14 years – travel agencies promotion bundles and competitive airfares attract more tourists and contribute to the growth of both industries

Another key driver in the historical growth of passenger traffic was the steady decrease in the price of air travel. This decrease was mainly driven by:

- Development of more fuel efficient aircrafts – airlines spent less on fuel and shifted some of the savings to passengers by offering lower prices
- Introduction of low-cost carriers (LCCs) – by minimizing operating costs and offering fewer services than typical airlines, LCCs were able to offer lower fares to passengers

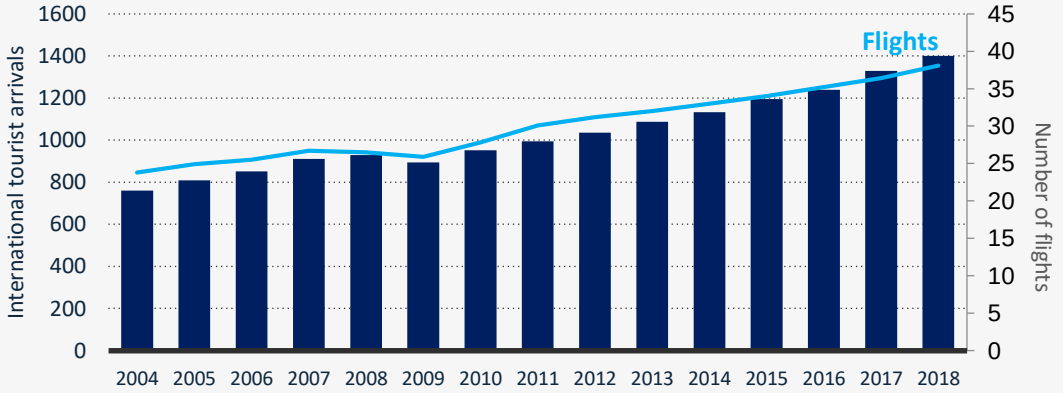
57% of international tourists traveled by air in 2018



International inbound tourism by mode of transport in 2018

Source: ATAG

The number of international tourist arrivals and the number of flights have been growing at similar rates since 2004



Historical growth of the number of international tourist arrivals and the number of flights worldwide (in millions)

Source: UNWTO

Sources: [3] ATAG; [6] UNWTO; [7] Wikiversity; [8] Pordata

3A. Tourism has an important role as a driver of economic growth

There is a causal link between tourism and economic growth, which has been proved through different methods in the last few years

The tourism-led growth hypothesis (TLGH) has been widely used among academics to test and prove a causal link between tourism and economic growth

- Proposed by Balaguer and Cantavella-Jordá (2002), the TLGH tests the hypothesis that the expansion of international tourism activities generates economic growth
- Several studies have demonstrated the temporal relationship between tourism and economic growth in different countries (spread worldwide) through different methods, based on the TLGH

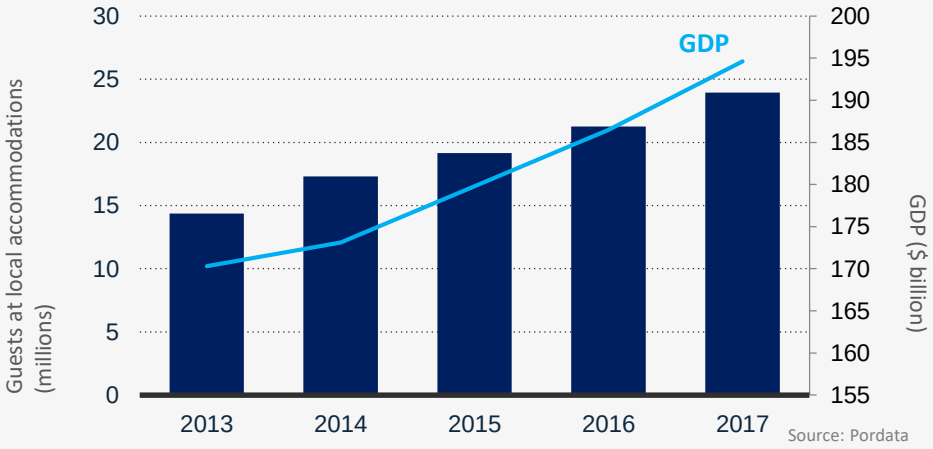
Assessing the temporal causal link between tourism and economic growth in Portugal

The goal of this study was to assess the temporal causal link between tourism and economic growth in Portugal based on the TLGH, analysing the effects of both domestic tourists and foreign tourists on economic growth

Results of the study

- The author of the study confirmed the TLGH through causality and cointegration tests, concluding that there is evidence of a long run cointegration relationship between guests' arrivals at local tourist accommodations and GDP growth
- The cointegration and causality tests support the thesis that the TLGH is valid for the Portuguese economy, showing there is a causal link between tourism and economic growth

Historical growth of GDP was linked to the number of guests staying at local accommodations



Historical growth of guests staying at local accommodations in Portugal and the country's GDP

Sources: [8] Pordata; [9] ScienceDirect; [10] Bento, J. P. C.

3A. Aviation plays a decisive role in driving global economic growth

The aviation industry contributed with just under $1.8 trillion to global GDP in 2016, generating almost 30 million jobs

World

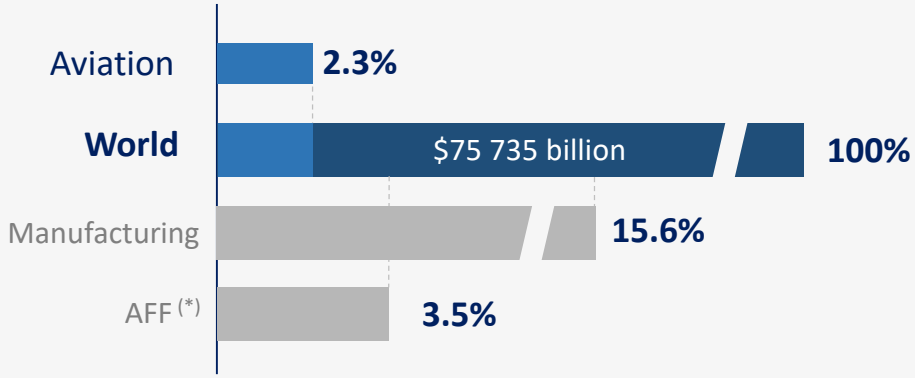
The aviation industry plays an important role in driving global sustainable economic growth. In 2016, airlines carried over 60 million of freight by air and transported over 4 billion passengers, facilitating the access to international markets and having a global economic impact of just under $1.8 trillion

4.1 billion
Passengers transported

41.9 million
Scheduled commercial flights

$149 billion
Spent in fuel by airlines worldwide

The aviation industry contributed to 2.3% of global GDP in 2016



(*) *Agriculture, Forestry and Fishing*

GDP Contribution, **%World GDP 2016**

The aviation industry generated approximately 29 million jobs worldwide and contributed with under $1.8 trillion to global GDP in 2016

GDP	**$704 billion**	**$637.8 billion**	**$453.9 billion**
	Direct	Indirect	Induced
Jobs	10 115 500	10 790 000	7 731 000

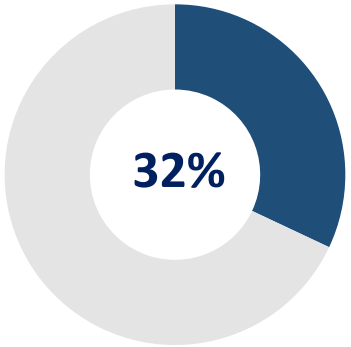
Total Jobs	Total GDP Contribution
28 636 500	$1 795.7 billion
35% Direct	**39%** Direct
38% Indirect	**36%** Indirect
27% Induced	**25%** Induced

Sources: [1] IATA; [3] ATAG; [4] IMF; [5] The World Bank

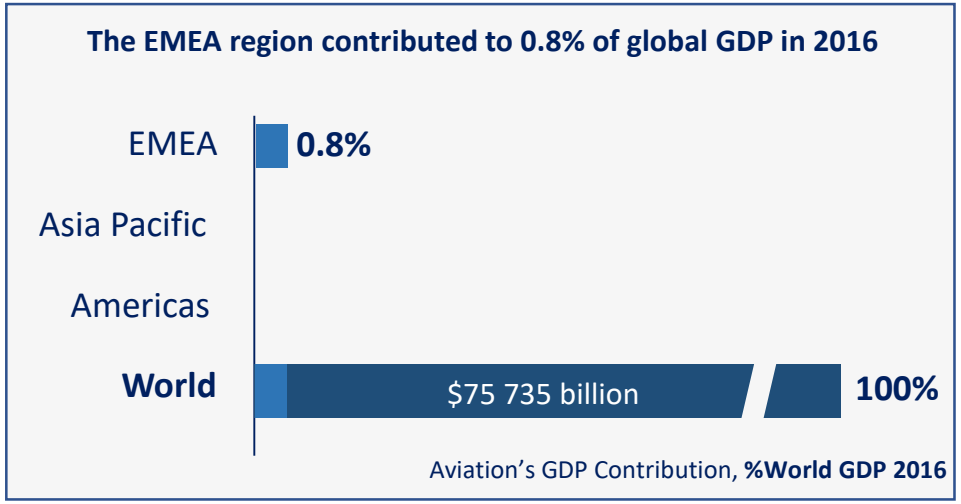
3A. The EMEA region contributed to 0.8% of global GDP in 2016

The EMEA region contributed with $613 billion to global GDP in 2016 and generated approximately 9.5 million jobs

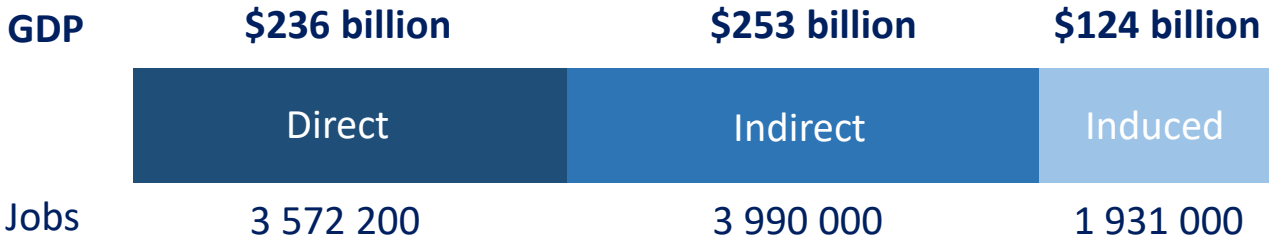
EMEA



2016 | **10.9 million** flights | **1.3 billion** passengers | **EMEA's share of global passenger traffic**



The aviation industry generated approximately 9.5 million jobs in the EMEA region and contributed with $613 billion to the global GDP in 2016



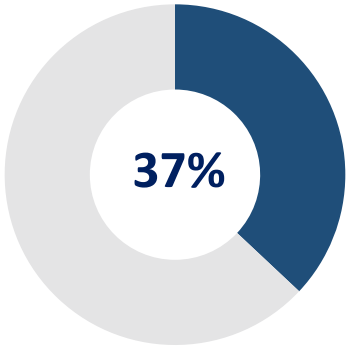
Total Jobs	Total GDP Contribution
9 493 200	$613 billion
38% Direct	**39%** Direct
42% Indirect	**41%** Indirect
20% Induced	**20%** Induced

Sources: [1] IATA; [3] ATAG; [4] IMF; [5] The World Bank

3A. The Asia-Pacific region contributed to 0.5% of global GDP in 2016

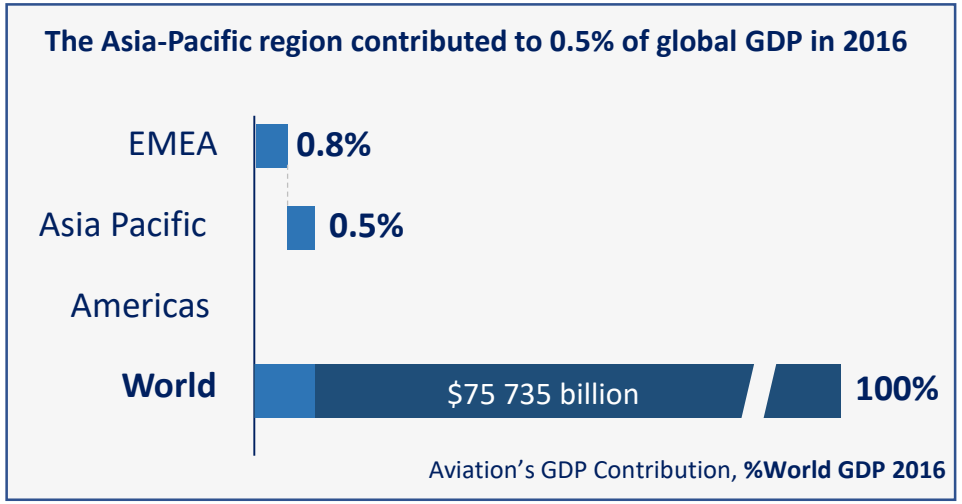
The Asia-Pacific region contributed with just under $397 billion to global GDP in 2016 and generated over 9.7 million jobs

Asia-Pacific



2016 | **11.8 million** flights | **1.5 billion** passengers

Asia Pacific's share of global passenger traffic



The aviation industry generated approximately 9.7 million jobs in the Asia Pacific region and contributed with $396.5 billion to the global GDP in 2016

GDP	**$148.7 billion**	**$119.9 billion**	**$127.9 billion**
	Direct	Indirect	Induced
Jobs	3 318 000	3 100 000	3 300 000

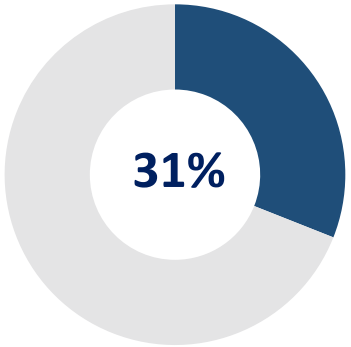
Total Jobs	Total GDP Contribution
9 718 000	$396.5 billion
34% Direct	**38%** Direct
32% Indirect	**30%** Indirect
34% Induced	**32%** Induced

Sources: [1] IATA; [3] ATAG; [4] IMF; [5] The World Bank

3A. The Americas region contributed to 1% of global GDP in 2016

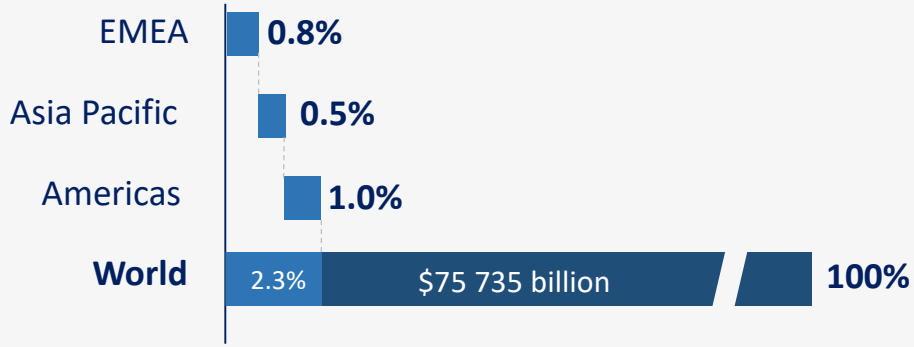
The Americas region contributed with $786 million to global GDP in 2016 and generated approximately 9.5 million jobs

Americas



2016 | **13.3 million** flights | **1.3 billion** passengers | **Americas' share of global passenger traffic**

The Americas region contributed to 1% of global GDP in 2016



The aviation industry generated approximately 9.5 million jobs in the Americas region and contributed with over $786 billion to the global GDP in 2016

GDP	**$319.5 billion**	**$264.7 billion**	**$202 billion**
	Direct	Indirect	Induced
Jobs	3 225 300	3 700 000	2 500 000

Total Jobs	Total GDP Contribution
9 425 300	$786.2 billion
34% Direct	**41%** Direct
39% Indirect	**34%** Indirect
27% Induced	**25%** Induced

Sources: [1] IATA; [3] ATAG; [4] IMF; [5] The World Bank

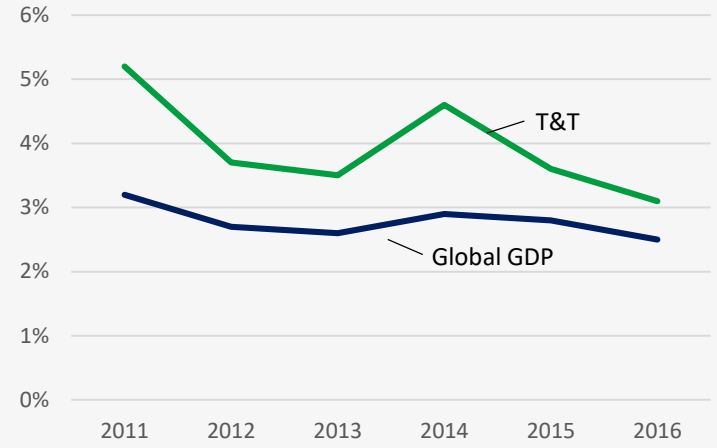
3A. Tourism contributed with approximately $898 billion to global GDP in 2016 and generated 36.9 million jobs

The economic contribution of the tourism industry to GDP grew by 3.1% in 2016, representing 1.2% of global GDP

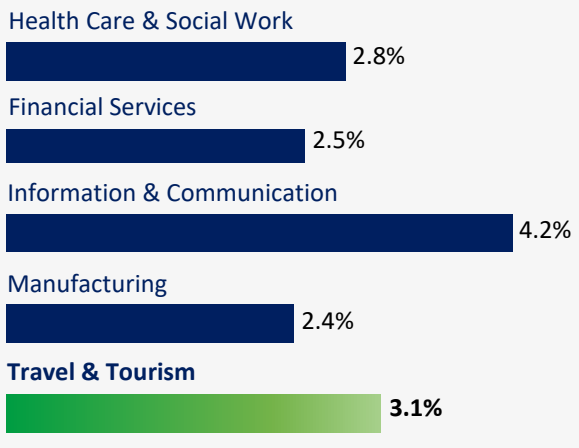
$897.7 billion
GDP contribution

36.9 million
Jobs generated*

- Over the past six years, the **Travel and Tourism (T&T) sector has outgrown global economy**
- Travel and Tourism's **direct contribution to GDP grew by 3.1%** in 2016, compared to a 2.5% growth in global economy as a whole(1)
- **Travel and Tourism also outgrew several economic sectors in 2016** – GDP contribution growth was higher than in other industries such as Financial Services, Manufacturing and Health Care & Social Work (2)
- The contribution of the travel and tourism sector to employment grew by 1.8% in 2016



(1) Annual growth of Global GDP and the Travel and Tourism industry from 2011-2016



(2) Growth of industries' contribution to GDP in 2016

Source: UNWTO

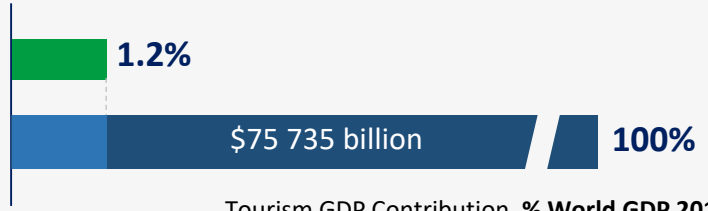
(*) Detailed description of the jobs generated by the tourism industry in 2016

15.6M direct jobs
supported by the spending of foreign visitors arriving by air

14.1M indirect jobs
in industries supplying the tourism industry

7.2M induced jobs
supported by air transport through employees spending

Tourism contributed to 1.2% of global GDP in 2016



Tourism GDP Contribution, **% World GDP 2016**

Sources: [3] ATAG; [5] WorldBank; [6] UNWTO

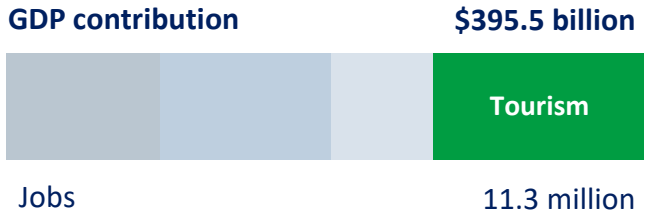
3A. The EMEA region had the biggest economic contribution to the global GDP in 2016

Even though the EMEA region was the biggest driver of global GDP contribution in 2016, the Asia-Pacific region generated more jobs

EMEA

In 2016, international tourists spending[(1)] in the EMEA region supported the generation of 11.3 million jobs and its economic contribution represented 0.5% of global GDP

- **Europe** – 5.1 million jobs and a $293 billion contribution to GDP
- **Middle East** – 1.3 million jobs and a $66.1 billion contribution to GDP
- **Africa** – 4.9 million jobs and a $35.9 billion contribution to GDP



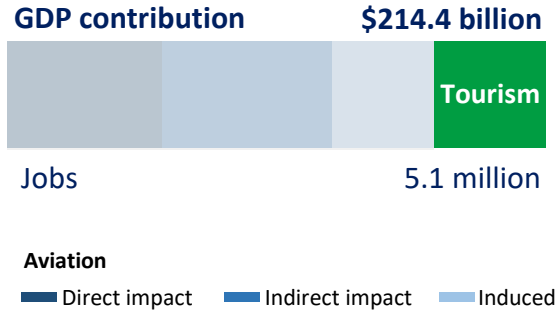
Asia-Pacific

Tourism driven by aviation stimulates consumer spending, which in turn sparks economic activity. In 2016, international tourists' spending in the Asia-Pacific region supported **5.1 million jobs** and its economic contribution represented 0.4% of global GDP

Americas

In 2016, international tourists spending[(1)] in the Americas region supported the generation of 5.1 million jobs and its economic contribution represented 0.3% of global GDP

- **North America**– 1.5 million jobs and a $149.7 billion contribution to GDP
- **Latin America and the Caribbean –** 3.6 million jobs and a $64.7 billion contribution to GDP

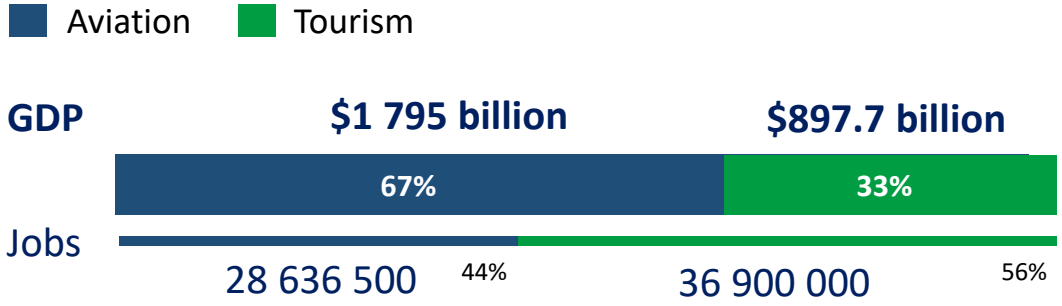


(1) Money spent on hotels, restaurants, tours, consumer goods and other services

Sources: [3] ATAG; [6] UNWTO

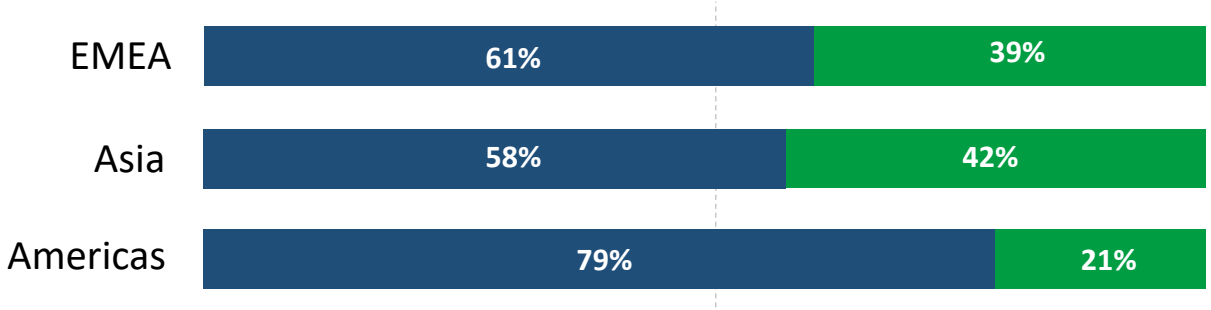
3A. Aviation and tourism combined contributed with just under $2.7 trillion to the global GDP in 2016

Together, these industries generated 65 million jobs and its economic contribution represented 3.5% of global GDP in 2016

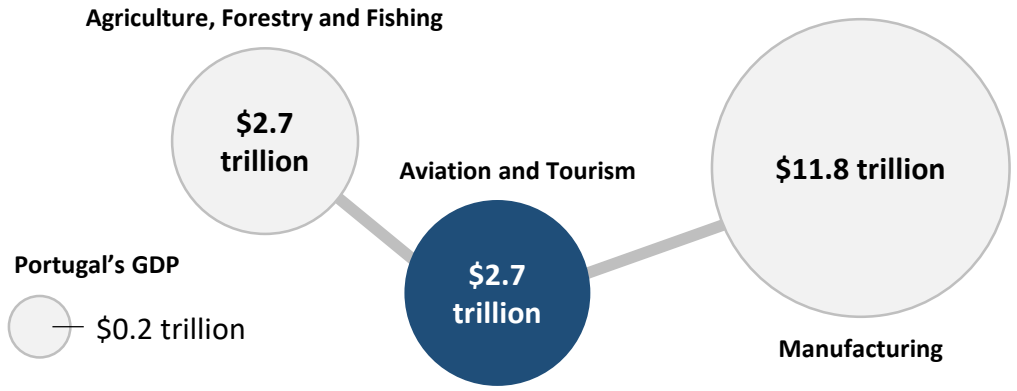


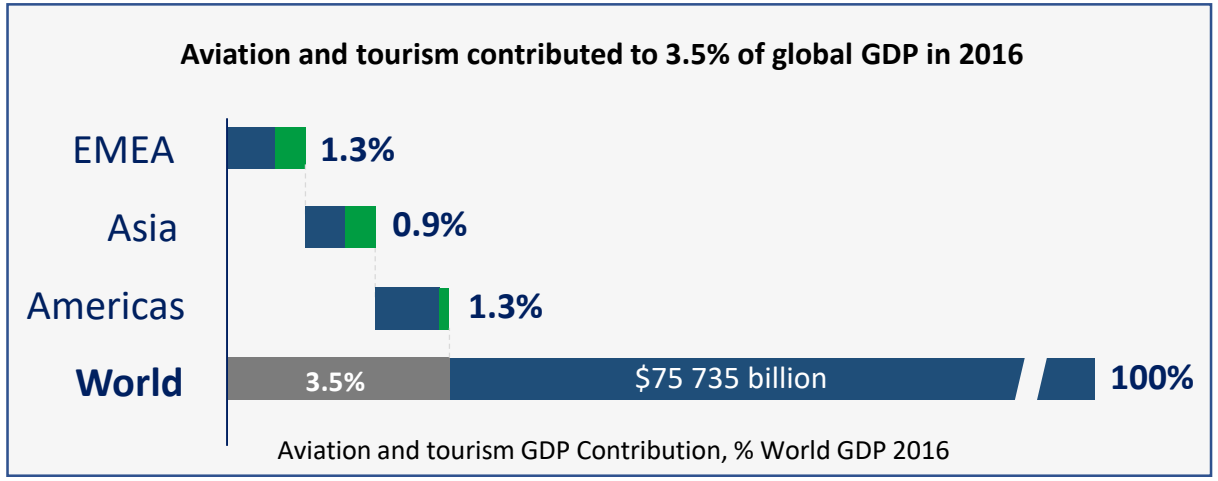
The aviation industry and the tourism industry combined contributed with just under **$2.7 trillion** to the world's GDP in 2016 and generated over **65 million jobs**

When comparing the GDP contribution of these two industries in each of the regions covered in this study, aviation is clearly the major driver of economic growth, always accounting for over 50% of GDP contribution. On the other hand, in the EMEA and Asia-Pacific region, the tourism industry generated more jobs than aviation



Contribution to GDP comparison over different industries in 2016





Sources: [3] ATAG; [4] IMF; [5] WorldBank

3B. Global aviation has a key role to play as a driver of sustainable development…

A developed aviation industry is fundamental to contribute towards the mobility strategy set by the United Nations

The Sustainable Development Goals (SDGs) are a collection of goals set by the United Nations in 2015 to address global challenges (e.g. poverty, inequality, climate, environmental degradation, prosperity, peace and justice). Each specific goal is set to be achieved by 2030 and is frequently measured with indicators for control purposes and to visualize progress

Global aviation is a **driver of sustainable development**, contributing to businesses, trade, tourism growth and the general well-being and good health of people. Besides, a developed aviation industry is fundamental to contribute towards the mobility strategy set by the United Nations

1 **The 17 sustainable development goals set by the UN in 2015**

2 **Criteria to identify the SDGs where aviation has the greatest direct impact***

- **Health / Human aid**
- **Access to opportunities**

3 **Goals the aviation industry has an impact impact based on the chosen criteria**

*Excluding SDG number 8 (Decent work and economic growth) already covered in the previous section of this study

Sources: [11] United Nations

…contributing to increased air connectivity, providing equal opportunities as well as medical and humanitarian aid

Aviation provides a connection to remote regions worldwide and provides a fast and safe transport of people and cargo

This goal is about making cities inclusive, safe, resilient and sustainable

Source: United Nations

This goal is about ensuring healthy lives and promoting well-being for all and at all ages

Source: United Nations

Aviation contributes to an increase in air connectivity, attracting foreign investment and providing opportunities to local communities

- Major airports in big cities handle millions of passengers, but smaller and lesser known airports also play an important role by connecting small communities to the outside world
- Air transport provides a connection to regions that otherwise could not be reached (road infrastructures are sometimes impossible to build, and even when possible, usually require a big and unattractive investment for governments)
- Several academic studies have proved that access to air services drive economic growth (a 1% increase in air passengers results in a 0.12% increase in per capita income in communities[(1)])

Despite not being directly linked to improving physical health, air transportation is many times crucial for medical and humanitarian aid

Aviation provides a fast and safe transport of people and cargo to remote places of the world

- **Ability to transport medicines and vaccines –** In some cases, medical supplies need to be delivered under tight time constraints and under controlled temperatures, making air transport the only viable solution to transport these supplies, especially for long distances

  ✓ Childhood vaccines prevent **322 million** illnesses

  ✓ Vaccination resulted in an **80% drop** in measles deaths between 2000 and 2017

[(1)]Ozcan, Ismail. 2014. "Economic contribution of essential air service flights on small and remote communities."

Sources: [11] United Nations; [12] CDC; [13] Advice Aircrews

3B. The aviation industry also provides access to quality education to students across the world

Air transport is crucial for students who are required to travel long distances in order to study

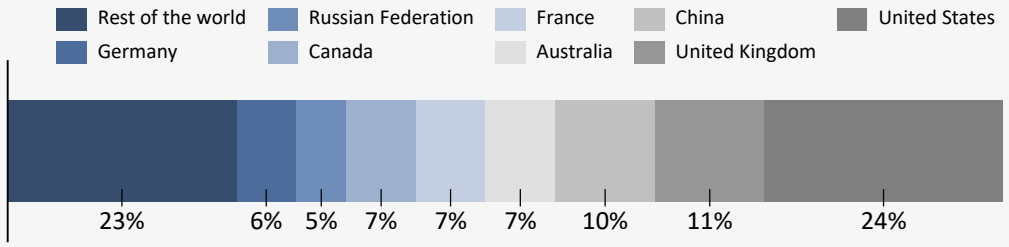
This goal is about quality education as the foundation to create sustainable development

Source: United Nations

Education plays a key role in the process of working towards sustainable development, as it is a necessity for the foundation of every successful society

- Access to higher-quality education means, in several cases, travelling to a foreign country. The aviation industry is key in providing transport over long distances between countries and ensuring students keep up with their time constraints
- Access to education provides students with unique tools that help them develop new skills and knowledge
- From 2005 to 2017, the number of students studying abroad increased from under 3 million to approximately 4.5 million
- The air transport connectivity provided by the aviation industry also supports many sub-goals of this SDG, such as:
    1. The expansion of global scholarships (e.g. students from developing countries are given the opportunity to travel to reputable foreign universities to study)
    2. The goal to ensure that both every men and women achieve literacy and numeracy
    3. The goal that learners acquire the knowledge and skills required to promote and work towards sustainable development

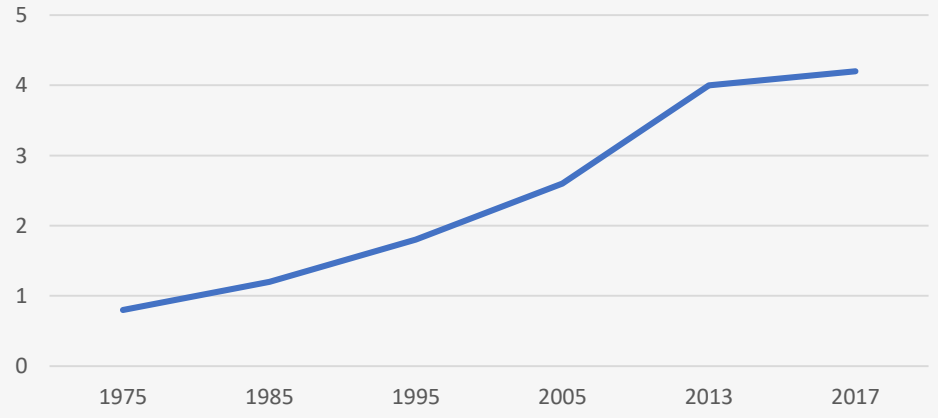
The U.S, U.K. and China were the preferred destinations for international students in 2017



Top global destinations for international students in 2017

Source: UNESCO

From 2005-2017, the number of students studying abroad increased from 2.6 million to 4.2 million (3.8% CAGR)



Growth in the number of students studying abroad, in millions from 1975-2017

Source: UNESCO

Sources: [1] ICAO; [3] ATAG; [11] United Nations; [14] UNESCO

3C. Noise, Greenhouse gas (GHG) emissions and air pollution are the main sources of concern in aviation

There has always been a negative environmental impact associated to the aviation industry

Despite having clear benefits such as the impact on **economic growth** as well as increased **air connectivity** and **mobility,** the aviation industry incorporates many environmental challenges that need to be faced. As the industry and the world changes, new technologies and innovative methods are discovered, creating new opportunities to tackle the environmental impacts from aviation

The sources of concern regarding the environmental impact of aviation

Concern: Landscape

Origin: Airports development

Negative Impact: Loss of important landscape features

Concern: Noise pollution

Origin: Aircraft

Negative Impact: Sleep disturbance, heart diseases, hearing impairments

Concern: Waste generation

Origin: Airport terminals, aircraft and airport service operators

Negative Impact: Hazardous wastes, air pollution from waste incineration, land and water contamination

Concern: Greenhouse gas emissions and air pollution

Origin: Aircraft and vehicles near airports

Negative Impact: Human health – cardiovascular diseases, climate change

	Indicator	Units	2017	% change[5]
Noise	Number of people inside L_{den} 55dB noise contours[1]	million	2.58	+12%
	Average noise energy per flight[2]	10^9 joules	1.24	-14%
Emissions	Full-flight CO2 emissions[3]	million tonnes	163	+16%
	Full-flight NOx emissions[3]	thousand tonnes	839	+25%
	Average fuel consumption of commercial flights[3]	litres[4]	3.4	-24%

[1] 47 major European airports; [2] All departures from Europe ; [3] All departures and arrivals in Europe; [4] Liters of fuel per 100 passenger kilometers; [5] % change since 2005

Explained in further detail in the next slide

Sources: [15] AEF; [16] EEA; [17] Aviation and Shipping; [18] EASA

3C. GHG emissions from aviation have more than doubled since 1990 and air pollution keeps increasing

Even though several technologies have been developed in recent years, emissions are still expected to keep growing

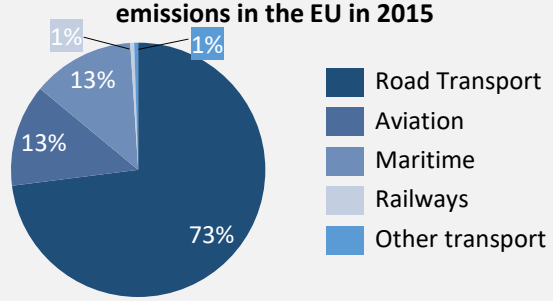
Greenhouse gas (GHG) emissions

- Since 1990, GHG emissions from the aviation industry in the EU have more than doubled
- From 2013-2017, emissions from the industry increased at an average annual rate of 2%
- In 2015, emissions from aviation accounted for 13% of total transport GHG emissions in the EU, only being surpassed by road transports

Major consequences of the Greenhouse Effect

1) **Global warming**
   - Increase of average temperature
   - Thawing of glacial masses
   - Global rise in sea level
2) **Human health**

Road transport accounted for 73% of GHG emissions in the EU in 2015



Proportions of transport GHG emissions in the EU in 2015

Source: EEA

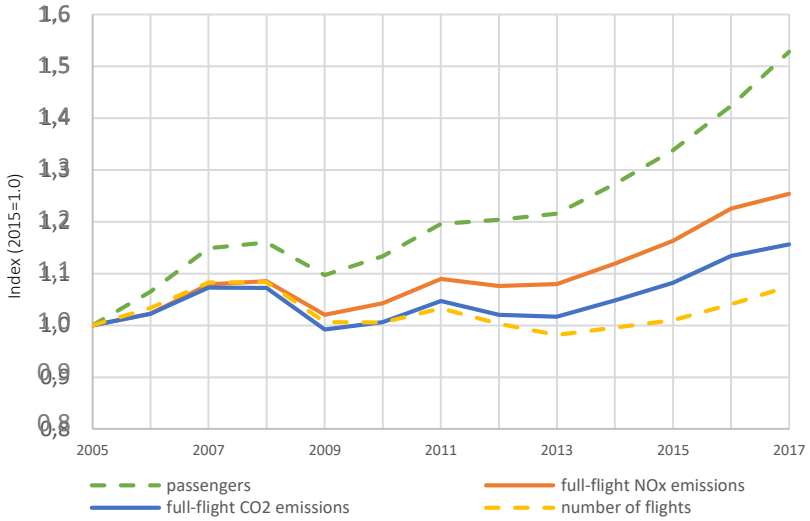
Air pollution

- The aviation industry is also a source of several air pollutants. The sources of these emissions are the aircraft and the large number of either airport service vehicles or other vehicles transporting passengers and freight to and from the airports
- Even though several technologies have been developed in recent years to reduce emissions and increase the efficiency of aircraft engines, it is not enough to reduce the overall emissions from the sector (emissions are expected to keep growing according to future forecasts from EASA)
- Air pollutants have a negative impact on human health and are influenced by several factors, including the altitude at which they are emitted, local weather conditions and the type of pollutants

16 000
Premature deaths caused by aviation emissions per year

3 700
Premature deaths caused by aviation emissions per year in Europe

CO2 and NO_x emissions have been growing as the number of flights increases over the past years



Relative evolution of key air traffic and environmental indicators

Source: EEA

Sources: [16] EEA; [18] EASA; [19] MIT; [20] IBERDROLA; [21] IOP Science

3C. Several measures have been put in place to control and monitor emissions and noise from the aviation industry

Over the last few years, there has been a growing concern over the environmental impact of aviation, especially in the EU

GHG Emissions and Air Pollution

2008

- Minimum air quality standards set under the EU's Air Quality Directive. Nowadays, to comply with this directive, every major airport has monitoring stations that measure the concentration of pollutants in the air

2010

- Global annual average fuel efficiency improvement of 2% was set to be achieved by the EU and European Free Trading Association (EFTA) states

2012

- Member states submitted action plans to the International Civil Aviation Organization (ICAO) for the first time. These action plans define internal policies and actions to reduce the impact of the aviation industry on the environment (updated action plans were also provided in 2015 and 2018)

Present

- All commercial flights are currently required to monitor, report and verify their CO2 emissions and airlines must follow specific monitoring plans provided by the European Commission
- A Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) deal was developed by the ICAO to help the aviation industry reach carbon neutrality in international flights after 2020

Noise

2002

- The Environmental Noise Directive, developed by the EU and implemented in 2002, aims to reduce the negative impacts of being exposed to harmful levels of environmental noise, introducing several measures that aim to reduce the noise emitted by the major sources, such as airplanes

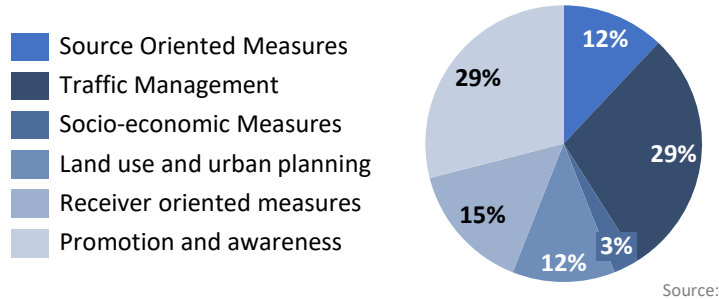
Present

- Every five years, member states are required to present strategic noise maps, including major airports in the report, and action plans with their current and future initiatives to manage noise issues. The first action plans were developed in 2008 and then again in 2013 and 2018, where member states identified several specific measures that enabled the reduction of noise from airplanes operations (e.g. charges for noisier airplanes) and at the receiver (e.g. better house sound insulation)

66%

Major airports in the EU have adopted an action plan at the end of 2018

Reported noise action plan measures relevant to major airports



Source: EEA

Sources: [1] ICAO; [16] EEA; [18] EASA; [22] European Commission

3C. Climate change is a growing risk threatening the operations and economic profitability of the aviation industry

The aviation industry is highly influenced by the environment, and in the last few years, consequences have become clear

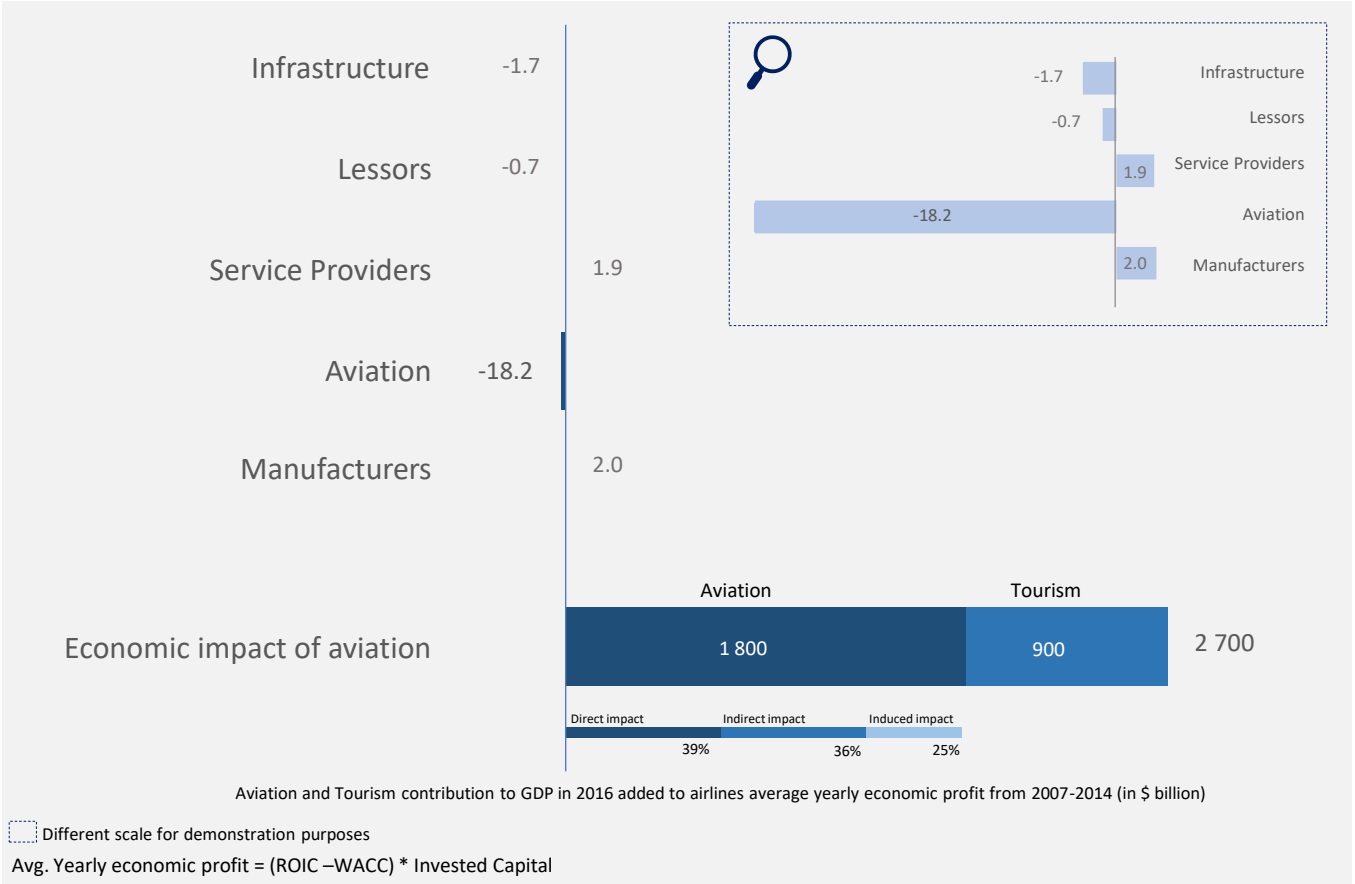
	What is currently happening	Impact	Economics	Operations
	• Consistent warmer temperatures in Europe, increasing at a faster pace than the global average	• Change in aircraft performance • Change in tourism demand patterns	✓	✓
	• Increasing number of heavy rain precipitation • Less snow overall but with heavier events	• Increasing number of delayed and cancelled flights • Occurrence of airports and access routes flooding	✓	✓
	• Changing wind directions • Increase in extreme wind speeds • Uncertain climate modelling • Increase in frequency of strong and damaging storms	• Increasing clear air turbulence • Increasing inconsistency of schedules and routes • Growing number of flight delays, re-routing • Increasing fuel burn • Complication of airport operations	✓	✓
	• Rise of sea levels • Uncertainty over storm surges	• Permanent or temporary loss of airport capacity and infrastructure access	✓	✓

Sources: [16] EEA; [18] EASA; [22] European Commission

3C. Airlines had a crucial role as drivers of economic growth, globalization and world development

An industry that had negative economic profits until 2015 was at the same time a driver of global economic growth

Aviation and tourism economic impact in 2016 added to airlines average yearly economic profit from 2007-2014 (in $ billion)



Aviation and Tourism contribution to GDP in 2016 added to airlines average yearly economic profit from 2007-2014 (in $ billion)

Different scale for demonstration purposes

Avg. Yearly economic profit = (ROIC –WACC) * Invested Capital

Even though airlines destroyed shareholder value until 2015, they had a crucial role as drivers of economic growth

The difference between the economic contribution of the aviation and tourism industry to the world's GDP in 2016 and the average yearly losses of airlines from 2007-2014 was $2.68 trillion. An industry that couldn't generate positive results for many years was at the same time driving global economic growth

Besides driving economic growth, the aviation industry played a key role in globalization and world development

Airlines made it easy for people to cross international borders, brought access to equal opportunities worldwide and contributed to the connection of the world.

Concerns regarding the environmental impact of aviation have grown. Yet, its benefits clearly outweigh this downside

The aviation industry had and still has a negative environmental impact, but it is clearly outweighed by the benefits that arise from the industry. Besides, industry stakeholders are working with official institutions to create a sustainable and environmentally friendly future for the industry

Sources: [2] McKinsey; [3] ATAG

Why are airlines destroying shareholder value and how do they contribute to the world economy?

Abstract

1. Which segment is the main driver of the aviation industry and what are the characteristics of full-service and low-cost carriers?

2. Why is the aviation industry destroying shareholder value?

3. What are the spillovers of the aviation industry?

4. Scalability: a new challenge for the future

Keywords: scalability, growth drivers & customer journey

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Scalability: a new challenge for the future

Executive summary

4A. Drivers of growth

- Global population is expected to reach 8.7 billion people in 2035, followed by an increase in global GDP and global trade
- The aviation industry will need to quickly adapt to the constant changes in the market and face new and exciting challenges
- The number of international passengers is expected to reach 7.3 billion by 2035 and the industry is expected to generate up to 30 million jobs
- Commercial passenger airlines have several profitability and scalability problems that can be mitigated by enhancing the customer journey

4B. Capacity concerns within the industry

- Infrastructure barrier can be surpassed with three measures
- Labour barrier can be solved by forming 617 000 pilots, 679 000 technicians and 814 000 cabin crew workers
- Fleet barrier can be surpassed by increasing load factor and overall capacity

4C. Customer journey analysis

- A customer journey approach can mitigate profitability and scalability issues and enhance the customer experience
- Customers want more transparency when it comes to booking and destination selection
- Customers want a smooth and quick transition from arriving at the airport to boarding the aircraft
- Customers want to continue connected to the outside world during their flight

To keep up with an increasing demand of air transportation services, the aviation industry needs to expand its fleet, infrastructures and labour requirements. A focus on the customer journey is expected to simultaneously help mitigate the profitability and scalability issues of the industry and enhance the customer experience.

4A. The aviation industry will be impacted by global macrotrends such as a growing population, GDP and trade

Global population is expected to reach 8.7 trillion people in 2035, followed by an increase in global GDP and global trade

Global population and income class

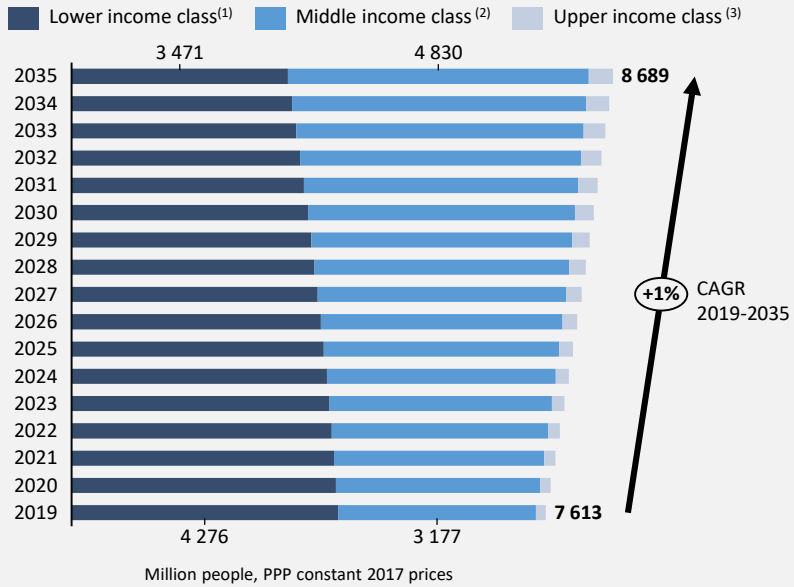
- Over the next 15 years, world population is expected to grow at a CAGR of 1%, reaching almost 8.7 billion of people in 2035
- The number of people in the middle and upper income classes are expected to increase, therefore, increasing the number of flights demanded since they have a higher average number of trips per year when compared to people in the lower income class

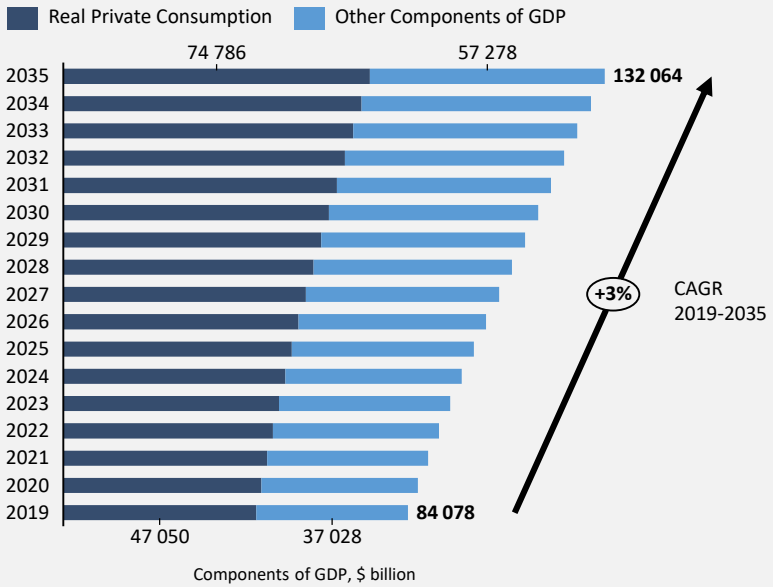
Global GDP

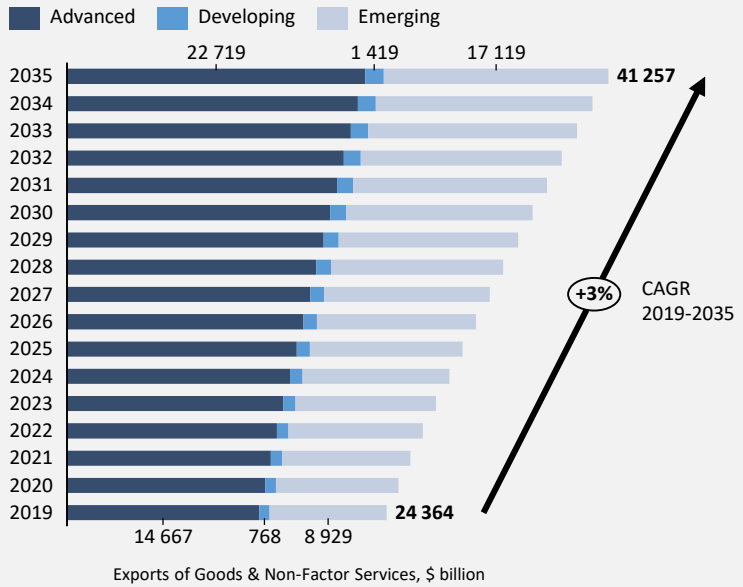
- Real private consumption (consumers' spending on goods and services) is expected to reach just under $75 trillion in 2035, accounting for more than 50% of global GDP
- Aviation will be one of the main drivers of this growth, generating jobs and driving consumption. Together with other components, global GDP is expected to grow at a CAGR of 3% from 2019-2035

Global trade

- The value of exported goods and non-factor services is expected to almost double until 2035. Developing and emerging markets are the main drivers of this expansion, growing almost 85% and 92%, respectively, from its 2019 value
- The aviation industry will be an important stakeholder, facilitating the transportation of freight and goods worldwide







(1) Household income <$20,000; (2) Household income $20,000-$150,000; (3) Household income >$150,000

Sources: [1] IATA; [2] Airbus

4A. Society, economy, technology and the environment will be the main drivers of change

The aviation industry will need to quickly adapt to the constant changes in the market and face new challenges

Society and Economy

New modes of consumption

- Consumers' behaviour towards consumption has shifted over the last few years, from a one-size fits all to a more authentic and personalized experience
- In addition, consumers are more aware of their environmental footprint and look for a sustainable consumption. Aviation is the perfect example of an industry that must adapt in order to offer customers what they want

Price of oil

- The future outlook for crude oil prices is somewhat uncertain. Lower prices may drive initial cost savings for the aviation industry, but the impact on global economy can be tragic
- Alternative fuels and energy sources are a real threat, as they might completely replace oil in the long term

Global population growth and global economy

- A growing population and economy will likely lead to a growing demand for the services provided by the aviation industry – freight and passenger transportation

Technology and Environment

New aircraft designs and configurations

- Several investments have been made in R&D in hope that breakthrough designs bring fuel savings (e.g. Flying-V, an aircraft design that promises 20% fuel savings when compared to the Airbus A350)
- Different airplane configurations have been tested to face the changing customer needs and wants

Alternative fuels and energy sources

- Alternative fuels and energy sources completely change how businesses and people consume energy
- Traditional fuels used by the aviation industry can be replaced by bioenergy or fuel cells and recent technological advances in energy storage will likely favour the growth of renewables worldwide

International regulation of emissions and noise pollution

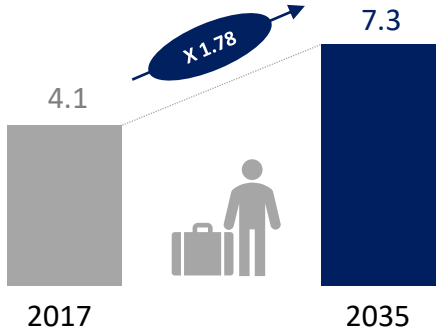
- Even though CO_2 emissions from the aviation industry have been increasing, its contribution is still low when compared to other transportation sectors (such as road transportation)
- The CORSIA deal and monitoring plans along with technological improvements will contribute to the process of lowering industry emissions

Sources: [1] IATA; [3] KLM

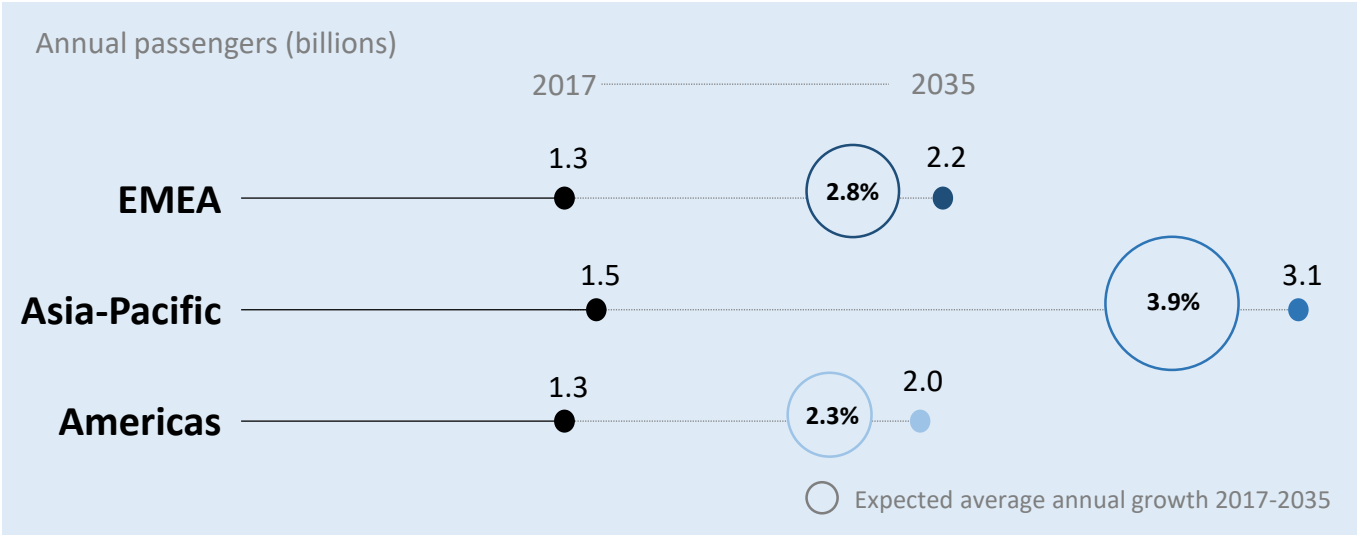
4A. Demand for air transport is expected to increase, generating new jobs and driving private consumption

The number of international passengers is expected to reach 7.3 billion by 2035 and the industry is expected to generate up to 30 million jobs

The number of international airline passengers is expected to increase 78% by 2035



- By 2035, the number of international airline passengers is expected to reach 7.3 billion, representing an increase of almost 80% when compared to the 4.1 billion passengers in 2017
- The Asia-Pacific region will be a key driver in this growth and is expected to more than double its number of international air passengers by 2035



In the next few years, there will be a lot of demand for commercial planes to keep up with an increasing number of international air passengers in the aviation industry

Global Commercial Fleet Projections

22 730
Additional aircrafts

The Asia-Pacific region will need two out of every five planes

Employment generated by the industry

An increasing global commercial fleet will lead to an increase in the workforce (e.g. crew, operators, technicians) to fly and maintain the airplanes

New jobs directly generated by the industry in 2035

2 110 000

Pilots
617 000

Technicians
679 000

Cabin crew
814 000

Together, aviation and the tourism industry are expected to generate between 20 million to 30 million new jobs by 2035 (direct, indirect and induced jobs)

Sources: [4] National Geographic

4B. Profitability and scalability are the main challenges the industry will need to address

Commercial airlines have several profitability and scalability problems that can be mitigated by enhancing the customer journey

Challenges the aviation industry needs to address	Main drivers
1. Profitability (Chapters 1-3)	Threatening forces; Volatile cost structure; Strategic decision; Legislation
2. Scalability (Chapter 4)	Infrastructure; Labour; Fleet

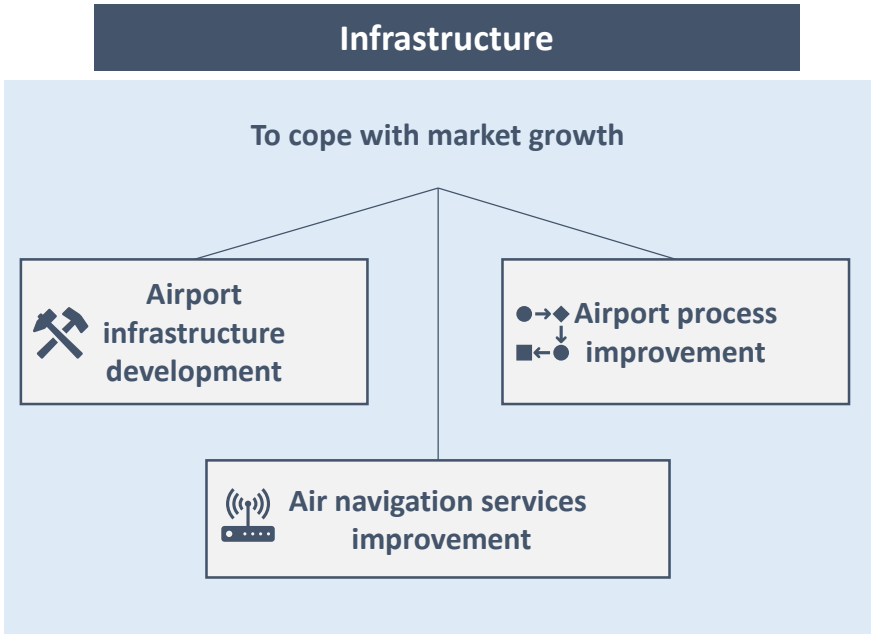
How to mitigate these challenges?

Customer journey

By analysing the industry through another perspective, both problems can be mitigated

4B. Infrastructure barrier can be surpassed with the help of three measures

Secondary airports are taking advantage of capacity pressure in nearby large airports by absorbing new demand



Airport infrastructure development

- Up to 2030, an investment of around $1.2 – 1.5 trillion is expected to be necessary for global infrastructure to keep up with the increasing air travel demand
- Investment will be used to build and improve runways and terminals so that cost-efficient facilities can balance capacity with demand
- LAX is implementing three projects for improving access to the airport, terminals and gates

Airport process improvement

- By improving airport processes idle time is reduced
- RFID use on checked baggage, biometric boarding, RFID use on passengers and advanced sensing cameras are some of the technological advances airports are capitalizing on to improve processes

Air navigation services' improvement

- Air navigation services' improvement is the most difficult barrier to surpass due to the need of bringing all stakeholders to agree on a solution
- ICAO is proposing a new methodology – Aviation System Block Upgrades – that aims at harmonizing circulation, increasing capacity and improving environmental efficiency

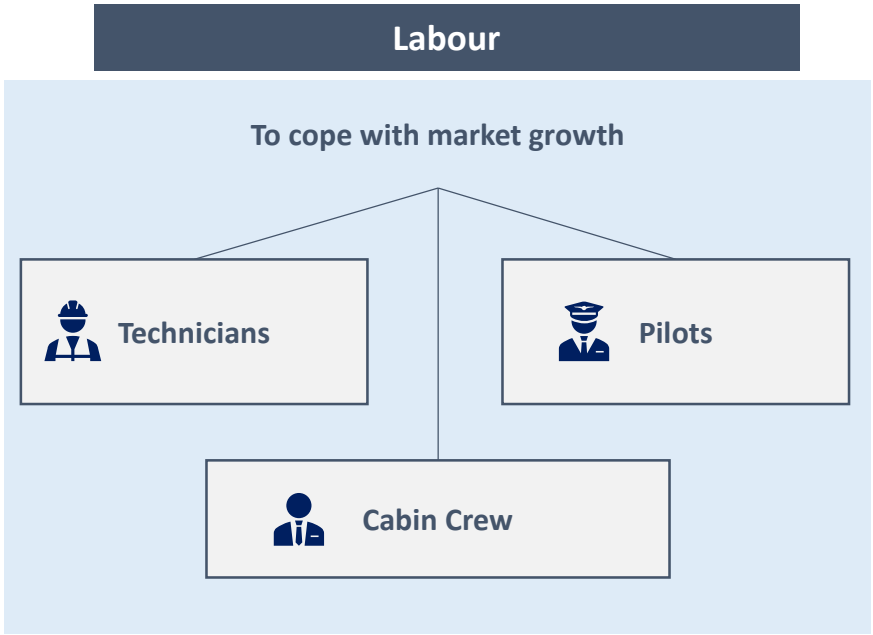
How is new demand being absorbed now?

- Increasing passenger growth is pressuring infrastructure and causing congestions
- Secondary airports are growing by capturing new demand from nearby airports
- Process optimization is also responsible for absorbing growing demand for air transport services by freeing time that was previously wasted

Sources: [5] Airports Council International; [6] IATA Economics; [7] ICAO

4B. Labour barrier can be solved by hiring 617 000 pilots, 679 000 technicians and 814 000 cabin crew workers

In the short-term there might be skill supply problems due to the demand in emerging markets



Technicians

- Technicians are highly-skilled workers who need a lot of knowledge to perform their jobs
- In the medium-term, there might be a shortage of skills supply due to the demand increase
- To have the required amount of professionals, the industry will need to invest in technology to accelerate the hiring process
- Aviation will need to hire about 679 000 technicians until 2035

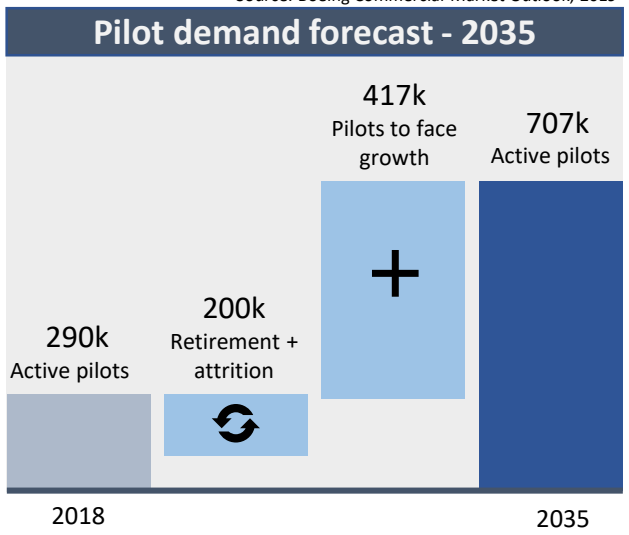
Cabin crew

- Cabin crew workers are the fastest to hire but a larger number of people will be needed
- Industry needs to position aviation as a desirable career path to attract candidates
- In the medium to long term, technological advances will enable the automation of many functions and decrease the size of the workforce
- Aviation will need to hire about 814 000 cabin crew members until 2035

Pilots

- Increasing competition in pilot labour market due to traffic increase creates a big challenge regarding recruitment and talent retention
- Emerging markets pulling high percentages of labour
- Mandatory retirement age of 65 imposed by most regulators
- Retirements and attrition is estimated at around 3% per year

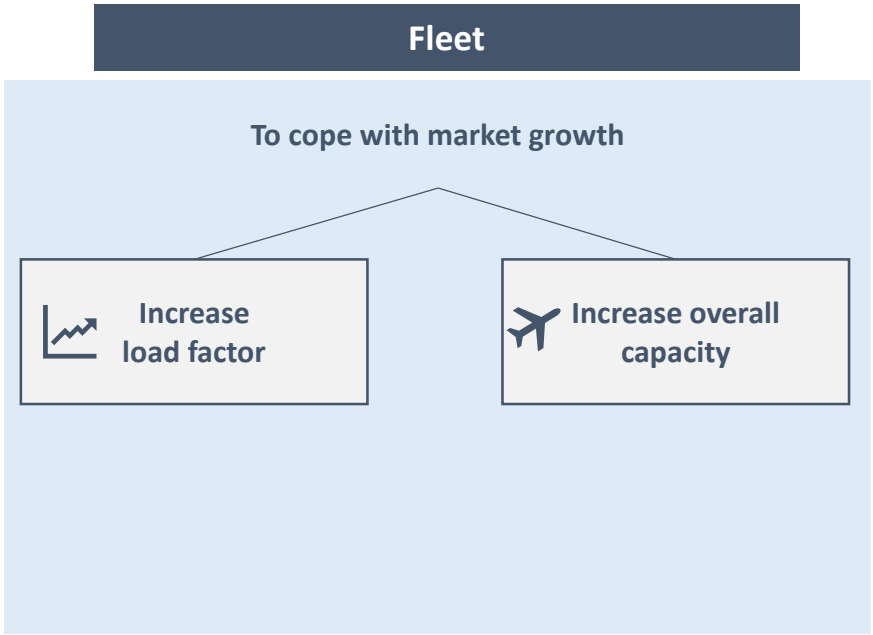
Source: Boeing Commercial Market Outlook, 2019



Sources: [8] CAE; [9] Boeing

4B. Fleet barrier can be surpassed by increasing load factor and overall capacity

A new fleet of more efficient airplanes will substitute the majority of today's active fleet delivery capacity to face growth concerns



Increase load factor

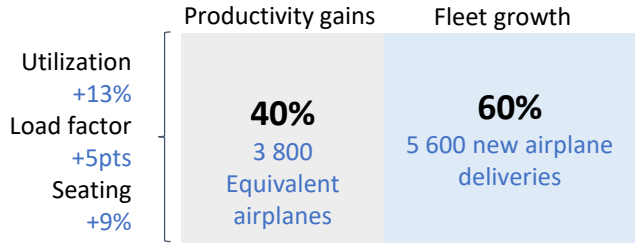
- Load factor reflects the percentage of available seats that is occupied by passengers. To increase it, airlines need to attract and transport a higher number of passengers
- Load factors are at all-time high levels of 82.1%, according to IATA. Increasing it will become more difficult in the near future

Increase overall capacity

There are three ways to increase overall capacity:

1. Increase the number of planes
2. Increase the number of hours flown by plane per day
3. Increase the total number of seats per plane by upgauging and increasing cabin densification: smaller leg room, smaller seats, smaller corridors, smaller toilets, *etc.*

RPK growth absorbed by productivity gains and fleet growth (07-17)



Source: Boeing Commercial Market Outlook, 2019

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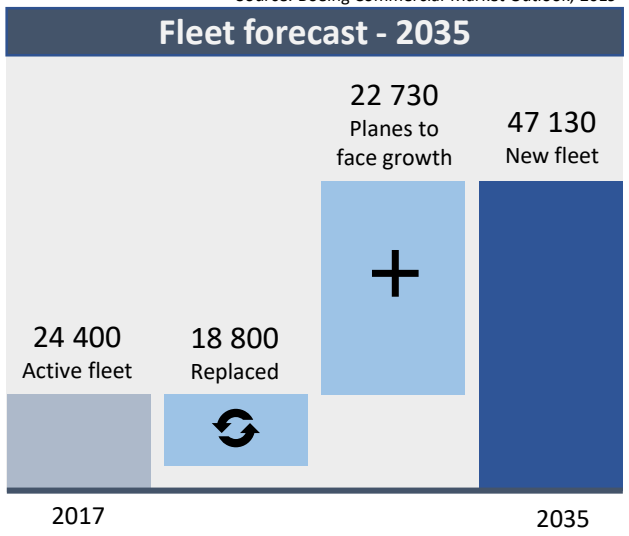


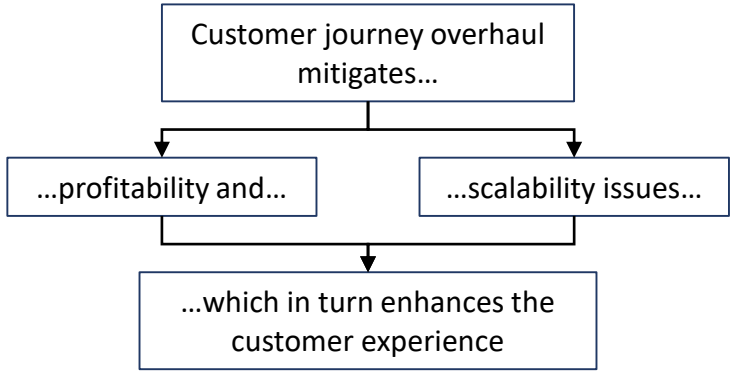
Sources: [2] Airbus; [10] Eurocontrol; [11] Boeing

4C. A customer journey approach can mitigate profitability and scalability issues and enhance the customer experience

The airline customer journey is composed of seven phases which have distinct characteristics and contribute to the travel experience

How to mitigate profitability & scalability issues?

- As previously discussed, the commercial passenger airline industry has severe profitability and scalability problems
- One way to solve both of these issues would be through the overhaul of the customer journey
- The current customer journey can be enhanced mainly through the implementation of innovative technologies
- Profitability and scalability problems can be mitigated by making the customer journey more efficient (cost cutting and better use of resources)
- Additionally, an overhaul of the customer journey will also simultaneously improve the customer experience



Customer journey

Planning → Booking → Purchase → Pre-trip → Departure → In-flight → Post-trip

Planning:

This is the first phase of the airline customer journey where the traveller decides where to go and researches on the possible flights and connections which might be necessary to reach the destination

Booking:

In this phase the customer will compare the prices of the several options identified in the previous phase as well as the different services provided, ultimately, choosing the options that satisfies best the customers' preferences

Purchase:

After identifying the best option for the customer the next step is the purchase of the flight tickets which can be done online or at a designated airline ticket stand where payments can be done in cash or via credit/debit card

Pre-trip:

This phase consists on preparing for the day of the flight which includes activities such as packing and booking a transport to the airport, if necessary

Departure:

Includes the checking-in at the airport, checking baggage if necessary, going through passport and security screening as well as boarding the aircraft

In-flight:

This phase is the actual flight to the destination where the customer can enjoy several included or paid services

Post-trip

This is the last phase of the airline customer journey where the passenger evaluates and provides positive or negative feedback regarding his / her flight experience

Sources: [12] Dent

4C. Customers want more transparency when it comes to booking and destination selection

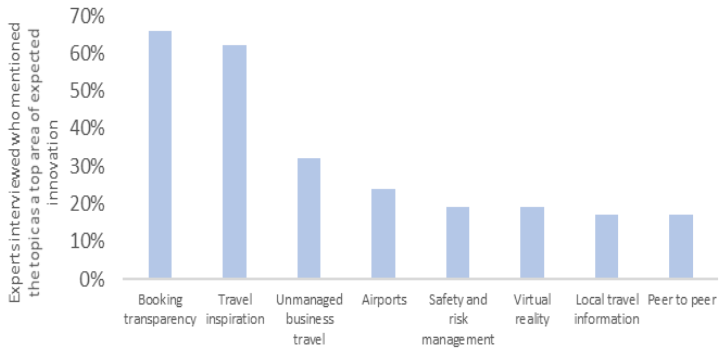
These frictions can be reduced through the use of AI, NDC, digitization and personalized services to meet specific customer needs

Frictions

Planning, booking, purchase and pre-trip:

- These four phases can be joined together since they all represent the customer journey before the passenger arrives at the airport
- In the past few years there have been efforts to increase searching and booking transparency by travel providers and aggregator websites
- Customers still struggle to find information on attributes other than price and to know when is the best time to buy flight tickets to get the best deal

Booking transparency and travel inspiration are the most likely to undergo innovation:



Experts interviewed by BCG on areas of expected innovation in the airline customer journey

Source: Becker et al.

Customer journey

Planning → Booking → Purchase → Pre-trip → Departure → In-flight → Post-trip

Artificial intelligence in travel recommendation

- Customers suffer from information overload and struggle to find information tailored to their needs
- Travel recommendation engines are using AI to extract useful information from millions of travel products and thousands of global destinations
- E.g. WayBlazer uses IBM cognitive computing technology to provide a 23% shorter path to booking and 81% quality increase in search results

New Distribution Capability (NDC)

- NDC is a travel industry-supported program launched by IATA which enhances the capability of communications between airlines and travel agents
- FSCs and LCCs can differentiate their products
- Aggregators and travel agents have access to full and rich air content of the airlines
- Corporate buyers and travellers benefit from a transparent shopping experience

Digitization

- Digitization technologies can increase customer satisfaction scores up to 10 percentage points
- Reduces costs by stream-lining and automating processes for savings of up to 10% in affected areas
- Increases revenues up to 10% by helping airlines generate deeper insights into customer preferences
- Decreases lead times needed to release new features for apps by up to 80%

Features tailored towards business travellers

- Few, if any, search and booking tools are tailored for the business traveller resulting in unmet needs
- Business travellers are the main users of airlines' mobile app, however, most airlines don't adapt them to their specific preferences
- Beneficial features include helping them to get out of airports quickly and making flight changing easier
- Instead, airlines focus on social media integration

Sources: [13] Boutin et al.; [14] Becker et al.; [15] IATA

4C. Customers want a smooth and quick transition from arriving at the airport to boarding the aircraft

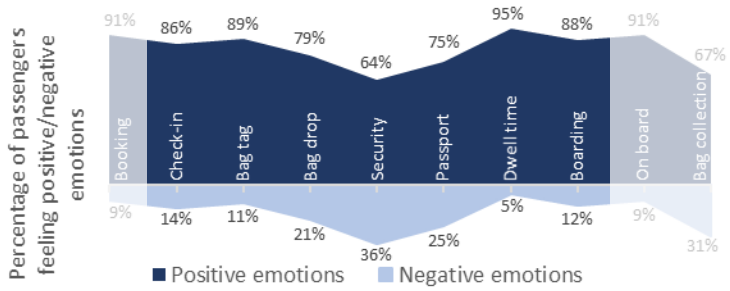
These frictions can be reduced through RFID and biometric technology as well as advanced sensing cameras

Frictions

Departure:

- Departure is defined as the moment the customer arrives at the airport until he / she is boarded on the aircraft
- As a result of the September 11 attacks in 2001, security at airports worldwide was escalated to prevent future terrorist plots
- Changes in airport security included: improved security on aircraft, improved security screening and identification checks
- Increased security meant that it took longer for customers to go through the departure phase

Security screening is where more passengers experience negative emotions in departure:



Emotional extremes during the airline customer journey (2016)

Source: SITA

Customer journey

Planning | Booking | Purchase | Pre-trip | **Departure** | In-flight | Post-trip

RFID use on checked baggage

- In 2018, approximately 6 bags were mishandled per thousand passengers and 46% of the times it is due to a transfer mishandling, costing the global airline industry $2.4 million
- RFID technology has led to a reduction of more than 70% of baggage mishandling in a 3 years Baggage Improvement Program

RFID use on passengers

- Up to 5% of aircraft airport delays are caused by late passengers or late bags at the gate
- OpTag system enables the immediate location of checked-in passengers who are either missing or late, reducing passenger-induced delays and speed up aircraft turnaround
- Improves airport efficiency, security and safety

Biometric boarding

- Self-service boarding gates which use facial-recognition technology
- Customers simply look into a camera prior to boarding, have their biometric data verified and then walk on to the plane
- Improved punctuality on domestic flights by 10% according to British Airways trial

Advanced sensing cameras

- Scientists from the Australian National University have invented a device with advanced sensing functions
- Cameras which can identify hazardous devices or dangerous chemicals in passengers' carry-on baggage when they walk through an airport
- Expedites passenger processing at airports and helps reduce waiting times

Sources: [14] Becker et al.; [16] SITA; [17] Swedberg; [18] Lloyd et al.; [19] Cooper; [20] Airport Technology

4C. Customers want to continue connected to the outside world during their flight

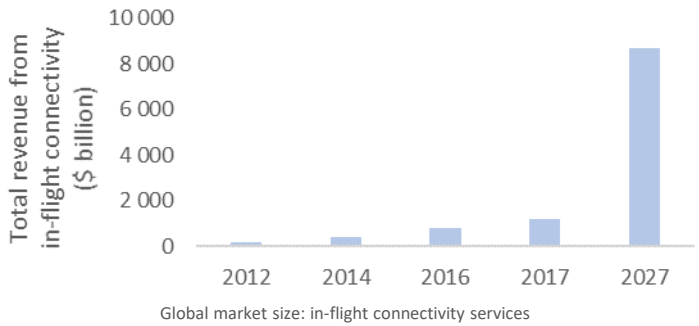
This friction can be reduced through IFC, on-board Wi-Fi access, a BYOD environment and offering an end-to-end customer experience

Frictions

In-flight:

- In-flight is defined as the moment the customer enters the aircraft in the airport of origin until he / she leaves the aircraft at the airport of destination
- Services related to passenger experience includes those services needed to maximise their flight experience
- Includes: cabin upgrades, cabin crew training, in flight entertainment (IFE), connectivity and booking
- Over the next 20 years this market is expected to represent a cumulative $1.1 trillion

In-flight connectivity revenues are expected to increase by $7.5 billion from 2017 to 2027:



Global market size: in-flight connectivity services

Source: Vanleynseele et al.

Customer journey

Planning | Booking | Purchase | Pre-trip | Departure | **In-flight** | Post-trip

In-flight connectivity (IFC)

- Emergence of smartplane concept
- Connected aircraft is a solution to answer passenger needs and give airlines' flight crews better significant benefits in the ways these can be met
- E.g. possibility of ordering food from your seat
- Cabin upgrade market is forecasted to represent $270 billion in 2038 (also includes seating, overhead bins, gallery, lavatory and emergency equipment)

In-flight Wi-Fi

- In-flight Wi-Fi is one of the customers' most requested services with 81% of passengers worldwide saying that they would use in-flight Wi-Fi if it were available in their next flight
- Global in-flight Wi-Fi market is expected to represent $5 600 million in 2021

Bring your own device (BYOD)

- A BYOD onboard environment allows airlines to offer passengers a benefit they have become accustomed to paying for
- This would be further enhanced with the availability of in-flight Wi-Fi
- Reduces in-flight entertainment costs as well as aircraft weight

End-to-end customer experience

- Customers expect the travel experience to be just as seamless as online shopping
- Airlines are connecting with passengers to integrate all touchpoint of their travel experience
- E.g. during the flight customers would be able to book a transport to their hotel which would arrive as soon as the flight lands at the airport

Sources: [2] Airbus; [11] Boeing; [21] Vanleynseele; [22] Inmarsat Aviation; [23] Statista

4B. Customer journey approach can mitigate the profitability and scalability issues and enhance the travel experience

Improving efficiency in every phase of the customer journey will result in cost cutting and a better use of the existing resources

Challenges the aviation industry needs to address	Main drivers
1. Profitability (Chapters 1-3)	Threatening forces Volatile cost structure Strategic decision Legislation
2. Scalability (Chapter 4)	Infrastructure Labour Fleet

Customer journey approach

Profitability:

Innovation in the customer journey will result in cost cutting for airlines which will mitigate the profitability issue in the industry

Customer journey

Scalability:

Improving efficiency within the customer journey will result in a better use of the existing infrastructure and resources which will mitigate the pressures of the scalability issues that the industry will face in the future